

11.2020

S P E C I A L I S S U E

# NATIONAL GEOGRAPHIC



## A WORLD GONE VIRAL

How the pandemic is changing our lives

**NEXT GENERATION** Young adults fight back, again

**DISCOVERY** Scientists become our new superheroes

**SOCIETY** A virus and social unrest test our humanity

**NATURE** Let's use this moment to help planet Earth



**Anderson's Crocodile Newt** (*Echinotriton andersoni*)

**Size:** Head and body length, 13 - 16 cm (5.1 - 6.3 inches) **Weight:** 12 - 45 g (0.4 - 1.6 oz) **Habitat:** Forests, grasslands and swamps with constantly humid ground cover **Surviving number:** Unknown



*Photographed by Shawn Miller*

# WILDLIFE AS CANON SEES IT

Hard to swallow. Anderson's crocodile newt deters predators like the introduced mongoose by piercing its own skin with its sharp-tipped ribs to show that it would be a pain – quite literally. A predator itself, this warty salamander's tastes run to beetles, earthworms, spiders and terrestrial isopods. Home is leaf litter, rocky crevices and the underside of rocks

and logs on six small Japanese islands. But serious habitat loss and collection for the illegal pet trade are making life very hard.

As Canon sees it, images have the power to raise awareness of the threats facing endangered species and the natural environment, helping us make the world a better place.



EOS System

**Canon**

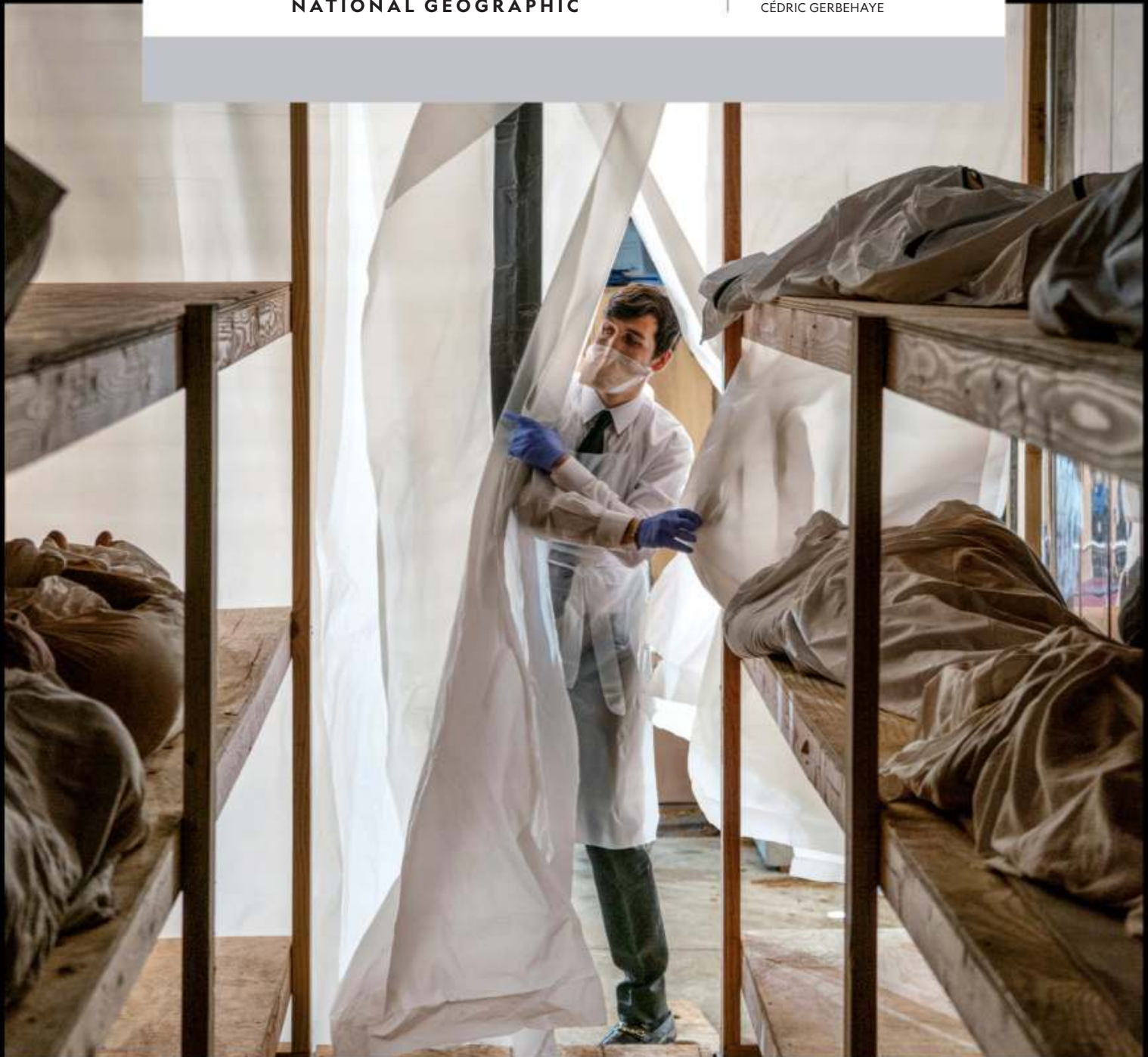
# CONTENTS

NATIONAL GEOGRAPHIC

## ON THE COVER

From a hospital in La Louvière, Belgium, this image shows a CT scan of the chest area and lungs of a 69-year-old patient with COVID-19.

CÉDRIC GERBEHAYE



## PROOF

### LIFE WITH COVID-19

The novel coronavirus has changed how we come into the world, live in it, and leave it. .... P. 8

## INTRODUCTION

### THIS DEVASTATING YEAR

COVID-19 dominated life in 2020 and left many wondering, What will recovery look like? BY CYNTHIA GORNEY ..... P. 19

## DATA SHEET

### THE FIRST 100 DAYS

How the virus spread across the globe. BY MANUEL CANALES AND IRENE BERMAN-VAPORIS ..... P. 23

## ESSAY

### LETTER TO MY GENERATION

The pandemic has hit 18- to 25-year-olds hard. But don't dismiss us as Generation Screwed. BY JORDAN SALAMA ..... P. 26

## DECODER

### CORONAVIRUS, EXPLAINED

How the virus attacks the human body. BY MANUEL CANALES AND ALEXANDER STEGMAIER ..... P. 32

## THROUGH THE LENS

### WHAT A COMMUNITY LOST

Larry Hammond's death resounds within the organizations he loved. BY WILL SUTTON; PHOTO BY MAX AGUILERA-HELLWEG ..... P. 36

At the Leo F. Kearns Funeral Home in Queens, New York, where he is a resident funeral director, Francisco James enters a refrigerated container filled with bodies—mostly of casualties of the COVID-19 pandemic—awaiting embalming or burial.

PETER VAN AGTMAEL,  
MAGNUM PHOTOS

DISPATCH

40

## A CARE CRISIS: BELGIUM

Overextended medical teams care for COVID-19 patients and listen to their fears. "If I don't do this," one nurse asks, "who will?"

PHOTOGRAPHS BY  
**CÉDRIC GERBEHAYE**

ESSAY

56

## IN SCIENCE WE MUST TRUST

After watching scientists debate, restate, and learn on the fly how to battle COVID-19, we should trust their work even more.

BY  
**ROBIN MARANTZ HENIG**

DISPATCH

66

## LIVES UPENDED: INDONESIA

The pandemic that filled graveyards also emptied streets. Still, people ventured out for essentials: religious observances and food.

PHOTOGRAPHS BY  
**MUHAMMAD FADLI**

ESSAY

76

## LET'S NOT WASTE THIS MOMENT

Will the pandemic have a lasting effect on how we treat planet Earth? It could—if it changes our thinking.

BY  
**ROBERT KUNZIG**

DISPATCH

90

## LOCKDOWN PAIN: JORDAN

Strict isolation measures held down the COVID-19 death toll but heightened joblessness and hardship, especially for refugees.

PHOTOGRAPHS BY  
**MOISES SAMAN**

DATA SHEET

104

## IMPOVERISHED BY COVID-19

The pandemic has hit the poor extremely hard and is projected to put 100 million more in extreme poverty by the end of 2020.

BY  
**ALBERTO LUCAS LÓPEZ**

DISPATCH

110

## A WEALTH GAP: KENYA

In Nairobi the virus looks very different to the affluent in spacious compounds than it does to the impoverished in crowded settlements.

PHOTOGRAPHS BY  
**NICHOLE SOBECKI**

ESSAY

122

## THE TIMES TEST OUR HUMANITY

We are reminded—by the pandemic and by social justice demonstrations—of the global ills and inequities that need our attention.

BY  
**PHILLIP MORRIS**

DISPATCH

132

## LOPSIDED LOSS: UNITED STATES

In three hard-hit areas, a photographer hears bereaved people's stories of losing their loved ones to COVID-19 or its complications.

PHOTOGRAPHS BY  
**WAYNE LAWRENCE**

# WHOLESOME

# INGREDIENTS

# REAL FLAVOR

Purina trademarks are owned by Société des Produits Nestlé S.A.



HEALTHFUL.  
FLAVORFUL.  
— **PURINA** Beneful —

- ✓ Farm-raised beef is the #1 ingredient.
- ✓ No artificial flavors or preservatives.
- ✓ A great taste your dog will love.

Learn more at [Beneful.com/recipes](https://www.beneful.com/recipes)

**PURINA**

Your Pet, Our Passion.®

# Contemplating a Remade World

BY SUSAN GOLDBERG PHOTOGRAPH BY CHRISTIAN K. LEE



In Killeen, Texas, relatives surround Demareyo Tittle, 19, who wears part of the outfit he'd planned for his high school's prom last May. It was canceled because of COVID-19 concerns.

**SINCE THE BEGINNING** of the year, this novel coronavirus has altered life as we know it. Worldwide a staggering number of people have contracted COVID-19, and a still growing number have died. No part of life is untouched: Work. School. Family life. Traditions such as graduations and, sadly, funerals, are changed nearly beyond recognition.

This special issue focuses on how the pandemic has remade our world—and how it might change our thinking and our actions even more in the future.

I think a lot about how this will affect kids. During video meetings we've held since we began working from home

Follow the scientists trying to stop COVID-19—and the next pandemic—in our new documentary *Virus Hunters*. It premieres on the National Geographic Channel on November 1 at 9 p.m. ET/PT.

in March, I see colleagues' young children in the background (and occasionally in the foreground). I worry about how being thrust into remote learning will affect them academically.

But I worry more about youngsters I don't see on these calls: kids for whom schools provided decent computers and internet access, and one meal (or more) a day. I pray that aid will continue even if schools stay closed, and hope those kids are resilient enough to bounce back.

I think too about the young people who were just coming into their own when the pandemic landed, upending so many dreams. These 18- to 25-year-olds have weathered challenges from the start, growing up in the shadow of 9/11 and practicing active-shooter drills from elementary school onward. The Great Recession hit many families hard, so the students shouldered mountains of debt to pay for college. And now they see internships canceled, job offers rescinded, an unintended "gap year." It's a rotten hand to be dealt. "Generation Screwed," some call them.

Not so fast. Recently I read an essay about 2020 by Cate Engles, who graduated in May from a private high school in Ohio. Like senior classes across the United States, hers "was immediately thrust into a world that didn't care about senior traditions, cumulative GPAs, and college plans," she wrote. There was no pomp, only unexpected circumstance.

She has delayed going to college for a year and aims to make the best of it, as her class did when its senior celebrations were canceled. "Instead of worrying over dresses and dates and corsages," she wrote, "our high school generation dedicated their weekends to fight for justice where it is long overdue."

She hopes the result of that will be "newspaper articles about the impact this generation had on the world, rather than on the dance floor."

I surely didn't have that kind of grace or wisdom when I was 18. You'll find the same determination reflected by other young people in an essay in this issue. Here's how writer Jordan Salama, himself just 23, describes this moment in history: "For those of us at the beginning of our adult lives, the faltering start caused by the pandemic means that our choices will matter even more."

Thank you for reading *National Geographic*. □



Life keeps  
**moving.**  
We're here for  
every step.

**You've worked hard to save so that you can pursue your hobbies.** We'll help you keep up the smart moves with free financial seminars, expert advice and personalized Insights in the U.S. Bank Mobile App.

Get started at [usbank.com/insights](https://usbank.com/insights).



**CONNECTION IN THE TIME OF COVID** Social distancing has its limits. After more than two months without any human touch, Mary Grace Sileo (left) and her daughter, Michelle Grant, and





DISPATCH

# LIFE WITH

---

The coronavirus has changed how we come into the world, live in it, and leave it.

---

# COVID-19

others in their family had a solution. They hung a clothesline and pinned a drop cloth to it in Sileo's yard in Wantagh, New York. With one on each side, they embraced through the plastic. PHOTO: AL BELLO, GETTY IMAGES



**LOVE IN THE TIME OF COVID** When the state of lockdown was lifted in Italy, postponed rituals could take place. Marta Colzani and Alessio Cavallaro donned masks inside the Church of San



Vito in the town of Barzanò, near Milan, for one of Italy's first post-lockdown weddings. The Vatican issued a decree in March allowing bishops to use their discretion when planning religious services. PHOTO: DAVIDE BERTUCCIO



**DEATH IN THE TIME OF COVID** When coronavirus deaths surged in Bergamo, one of Italy's hardest hit cities, its morgue and crematorium were overwhelmed. Italian Army troops were brought



in to transport coffins from Bergamo to several other cities in northern Italy. Here, workers in Novara carry coffins from the army truck to the cemetery's crematorium. PHOTO: ALEX MAJOLI, MAGNUM PHOTOS



**BIRTH IN THE TIME OF COVID** Life can't always wait. In late April, Kim Bonsignore had planned to have her second child in a hospital near her Manhattan home. The coronavirus's effects on



hospitals changed her mind, and she delivered her daughter, Suzette, in her living room. The pandemic and economic uncertainty may deter couples from having more children now, experts say. PHOTO: JACKIE MOLLOY



**RESILIENCE IN THE TIME OF COVID** After 11 weeks in complete lockdown, China's Hubei Province relaxed the stay-at-home order for its more than 55 million people. Residents





trickled out of their homes, nearly all wearing masks, to return to activities once considered routine and carefully reclaim small pleasures, such as dancing outdoors. PHOTO: GETTY IMAGES

# IAMS<sup>®</sup> WHO I AM<sup>™</sup>

Nurture their  
loving hearts  
with IAMS<sup>™</sup>  
Large Breed



# We'll Move On From This Devastating Year. But How? To What?

---

Say novel coronavirus, or SARS-CoV-2, or COVID-19. By any name, it has seized 2020, mocking our defenses and dominating our existence. In this issue, *National Geographic* explores the pandemic's implications for science, for the environment, and for cultures throughout the world.

---

BY  
**CYNTHIA GORNEY**

19

**DURING THIS YEAR**—“this devastating year,” as Robin Marantz Henig writes in the pages that follow—a man in Central Java assembled a barrier from bamboo poles, painted LOCKDOWN onto a piece of vinyl, and blocked the entrance to a village road. A Belgian undertaker began dressing for work in a hazmat suit. A child in Detroit complained of headache; a month later, during the memorial service that only 12 people were permitted to attend, her parents grieved behind face masks.

Here's what the year has demanded we understand: that a single phenomenon connects these people, these places, this sorrow, this fear. Most of us are neither epidemiologists nor Spanish flu survivors; for most of us, before 2020 the word “pandemic” belonged to history, dystopian fiction, or books of warning from science journalists like Henig. The effort to comprehend, to grasp the new coronavirus as the actual global event it has become, is exhausting.

Trying to follow the science alone can overwhelm even the practiced observer, as Henig points out in one of this special issue's examinations of the pandemic: “Even for a science geek like me, it has been unsettling to watch [scientists] debate, disagree, pivot, and reassess. I've been wishing instead that some lab-coated hero would just swoop in and make it go away.”

To call the essays and images collected here a record of the pandemic is an act of hubris and of hope; a record is a thing you look at afterward, in retrospect. When do we get to afterward? We will move on because we must, but how? To what? And what has changed us during this devastating year? These are some of the questions the writers and photographers in this issue set out to explore.

**IN HER TROUBLED** reflection on the perception of scientific research in a coronavirus future, Henig wonders at the hyperspeed of the work, much of it conducted with unprecedented openness before a public also desperate for a lab-coated hero.

“Maybe our unfiltered view will turn out to be a good thing,” she writes. “Maybe, in a weird way, watching scientists try to build a plane while they're flying it—as some have described coronavirus research—will be good for



● PHOTOGRAPH BY **DANNY WILCOX FRAZIER**

our overall understanding of the scientific process.”

Maybe. We are an impatient, self-obsessed species, we human beings, capable of magnificent heroism and unbelievable stupidity. The odds of us learning a sustainable way through this calamity? Teetering, it seems, from one month to the next, one day to the next.

While we were mastering the vocabulary of quarantine and the 20-second handwashing, the planet’s temperature continued to climb.

**1.** Another debunked tale claimed that during the pandemic, 14 elephants broke into a Chinese village, got drunk on corn wine, and passed out in a tea garden.

Pandemic-side-effect optimism wafted by, to be sure, some of it merited. The dolphins returning to the Venice canals **(1)**—sorry, not true, though we ardently wished it were. The Punjabis who could see the Himalaya for the first time in decades, because economic slowdown reduced pollution so much—yes, that was true, like the cleaner-air reports from Bangkok and São Paulo.

There was a weirdly poetic phrase, “cessation of movement,” amid Kenyan president Uhuru Kenyatta’s declarations as he ordered his country’s first pandemic lockdowns. It did seem for a while as though the whole world stilled in 2020, one region



In retirement Chester Lovett of Detroit, a former mail carrier, hoped to spend time with his 10 children. Then Lovett died of COVID-19 complications, and under

pandemic rules only 10 people at a time could attend his funeral. After the service, Jerry Lovett released a dove to symbolize his brother Chester's spirit taking flight.

**2.** About half of U.S. workers—in retail, transport, and other service jobs—can't work from home, so they'll likely fall behind those who can, says Stanford University economist Nicholas Bloom. He warns that the situation is like "a time bomb for inequality."

at a time. Those empty boulevards. The shuttered businesses. A Barcelona quartet playing Puccini to an opera house full of potted plants.

But even those able to hole up indoors could see how wrong it was to imagine that movement had ceased. Ambulances were rolling, emergency rooms and ICUs frenzied. A massive swath of working and poor people still face coronavirus contagion daily because they have no other choice. **(2)**

As Robert Kunzig writes in his essay about the pandemic's repercussions for the environment, air pollution is rebounding now, and this year the Siberian tundra burned. "Will the experience of COVID-19 change in some lasting way how we treat this planet, as nearly eight billion humans scramble to make a living on it?" Kunzig asks. "What would it look like if the economies of the world were stewarded within limits set by nature?"

The devastating year made some of us into more insistent deniers, especially in the United States, which by mid-April registered the world's highest COVID-19 death toll, and by the end of August reported some 180,000 deaths, about 50 percent more than the next closest nation, Brazil. The year made new warriors too, as writer Phillip Morris and others in this issue remind us—people willing to put on the damn face masks and do what they can to lead, to console, to care for people around them.

*What would it look like if*, the infinitely variable speculation begins—and 2020 takes it from there:

If we replaced the applause for workers suddenly labeled "essential" with higher pay, better protections, and guaranteed health benefits. If we forced ourselves to read infection numbers not to keep reassessing our personal risks, but to take in the disproportionate misery the pandemic is bringing this country's Black, Latino, and Native American families. If we studied up close the faces of COVID-19 bereaved, when it's more comfortable to avert our eyes.

That child in Detroit? Her name was Skylar Herbert. Her mother is a police officer, her father a firefighter. She was five years old. □

---

**Cynthia Gorney** is a *National Geographic* contributing writer. She wrote about human closeness and social distancing in the July 2020 issue.

# FROM GENERATIONS TO COME: THANK YOU.

If you are one of the many members of the **Alexander Graham Bell Legacy Society** thank you for your critical support. Your investment is helping us identify the scientist, explorers, educators, and storytellers who are changing our world for the better.

We invite you to create a legacy of your own and help us sustain our momentum by preparing the next generations to do even more to care for the planet. **Won't you join us?**



Dominique Gonçalves a Mozambican Ecologist and National Geographic Fellow, is focused on elephant conservation in Gorongosa National Park.



## CREATE A LEGACY OF YOUR OWN

- Yes! Please send me information on leaving a gift to the National Geographic Society.
- The National Geographic Society has already been included in my estate plans.
- I would like to speak to someone about making a gift. Please call me.

Mail to: National Geographic Society  
Office of Planned Giving  
1145 17th Street, N.W.  
Washington, D.C. 20036-4688

Contact: [legacy@ngs.org](mailto:legacy@ngs.org)  
(800) 226-4438  
[natgeo.org/give/future-gifts](https://natgeo.org/give/future-gifts)

NAME

ADDRESS

PHONE

EMAIL

# THE FIRST 100 DAYS

BY  
**MANUEL CANALES &  
IRENE BERMAN-VAPORIS**

How the COVID-19 outbreak grew from a few cases in China to a global pandemic in less than three months

Leaked reports cite what health officials describe as cases of viral pneumonia in Wuhan, China. Not even three weeks later, similar cases are confirmed in Thailand, Japan, and South Korea. The U.S. and Europe follow soon after.

First cases reported

**DEC. 31, 2019**  
Wuhan has 27 pneumonia cases of unknown cause.

**JAN. 30, 2020**  
The World Health Organization declares a global health emergency.

**FEB. 13**  
A spike in China includes previously suspected cases.

**FEB. 24**  
New cases of COVID-19 outside China surpass the number inside China for the first time.

**MAR. 11**  
The WHO classifies the spreading crisis as a pandemic.

**APR. 3**  
More than a million total cases are confirmed worldwide.

- Asia
- Europe
- North America
- Australia and Oceania
- Africa
- South America

**1,420,000+**

GLOBAL CASES CONFIRMED IN THE FIRST 100 DAYS. CONFIRMED CASES ARE ONLY A PORTION OF THE TRUE NUMBER OF CASES.

**FEB. 26**  
Within 58 days, cases are confirmed on every continent except Antarctica.

**MAR. 22**  
The U.S. has the greatest number of daily cases.

## THE WORLD'S RESPONSE

Many countries issued health and containment policies to curb the spread of COVID-19. Ninety-two percent of countries had implemented significant lockdown measures by April 8.



# CONTAINING COVID

COVID-19 hit countries at different times, and not all governments took swift action in the 100 days following their first case. From no restrictions to stringent lockdowns, no approach was guaranteed to suppress the contagion.

## LOCKDOWN LEVELS

This index assesses the intensity of a government's response across 11 containment and health measures, including school and work closures, stay-at-home orders, and travel restrictions.

**No clear method for success**  
Policy strictness and deaths in the 100 days after a country's first confirmed case

### Government response



Number of days before a country implemented significant measures

### Daily deaths (seven-day average)



**NEW ZEALAND**  
The island nation's fast, decisive action kept the virus largely under control.  
Feb. 28

23

First case reported  
Feb. 1

**BELGIUM**  
For many of its first 100 days, Belgium had the world's highest per capita mortality rate.

Feb. 4

Mar. 7      40

9

**SOUTH AFRICA**  
The country rapidly adopted strict measures and deployed the army to enforce them.

Mar. 6

Jan. 31

24

Jan. 13, 2020

**THAILAND**  
Over one million village health volunteers went door-to-door, helping to keep deaths low.

Jan. 21

23

Feb. 26

59

128

Dec. 31, 2019\*

27

JANUARY 2020

FEBRUARY

MARCH

\*IN MARCH, THE SOUTH CHINA MORNING POST REPORTED THAT CHINA'S FIRST CASE MAY HAVE BEEN ON NOVEMBER 17, 2019.



POPULATION



4,783,062

COUNTRIES WITH 5 M+

Highest number of daily deaths 2,725

107

**SWEDEN**

Sweden didn't close schools or businesses; it saw more deaths than neighboring countries under lockdown.

333

Never reached significant response threshold

**PERU**

Despite one of the world's quickest and strictest lockdowns, Peru saw COVID-19 deaths continue to climb.

171

822

50 M+

63

21

**ITALY**

The initial crisis overwhelmed hospitals in northern Italy, but the country gradually flattened its curve.

993

**UNITED STATES**

Individual states set a broad range of policies in the absence of a unified national approach.

**BRAZIL**

In cumulative number of deaths, Brazil was second only to the U.S.

The speed of a country's response was critical. Policies that were proactive—rather than reactive—often were more successful.

74

100 M+

**CHINA**

After the virus emerged in Wuhan, China imposed an unprecedented lockdown on the entire city for 76 days.

1,000 M+

APRIL

MAY

JUNE

# KEYTRUDA IS A BREAKTHROUGH IMMUNOTHERAPY.



## FOR TODAY

KEYTRUDA is a potential first treatment for **3 out of 4 patients** with advanced non-small cell lung cancer (NSCLC).

KEYTRUDA is also used to treat **more patients** with advanced lung cancer than any other immunotherapy.

## FOR THE FUTURE

**Ongoing clinical trials** are exploring if KEYTRUDA can help treat more patients.



KEYTRUDA may be your first treatment for advanced NSCLC, either in combination with chemotherapy or used alone as a chemotherapy-free option.

**Ask your doctor if KEYTRUDA is right for you.**

**KEYTRUDA is a prescription medicine used to treat a kind of lung cancer called non-small cell lung cancer (NSCLC).**

### ➤ **KEYTRUDA + CHEMOTHERAPY, NONSQUAMOUS**

It may be used with the chemotherapy medicines pemetrexed and a platinum as your first treatment when your lung cancer has spread (advanced NSCLC) **and** is a type called “nonsquamous” **and** your tumor does not have an abnormal “EGFR” or “ALK” gene.

### ➤ **KEYTRUDA + CHEMOTHERAPY, SQUAMOUS**

It may be used with the chemotherapy medicines carboplatin and either paclitaxel or paclitaxel protein-bound as your first treatment when your lung cancer has spread (advanced NSCLC), **and** is a type called “squamous.”

### ➤ **KEYTRUDA USED ALONE, PD-L1 POSITIVE**

It may be used alone as your first treatment when your lung cancer has not spread outside your chest (stage III) and you cannot have surgery or chemotherapy with radiation, **or** your NSCLC has spread to other areas of your body (advanced NSCLC), **and** your tumor tests positive for “PD-L1” **and** does not have an abnormal “EGFR” or “ALK” gene.

### ➤ **KEYTRUDA AFTER CHEMOTHERAPY, PD-L1 POSITIVE**

It may also be used alone for advanced NSCLC if you have tried chemotherapy that contains platinum and it did not work or is no longer working **and**, your tumor tests positive for “PD-L1” **and** if your tumor has an abnormal “EGFR” or “ALK” gene, you have also received an “EGFR” or “ALK” inhibitor medicine that did not work or is no longer working.

PD-L1 = programmed death ligand 1;  
EGFR = epidermal growth factor receptor;  
ALK = anaplastic lymphoma kinase.


## IMPORTANT SAFETY INFORMATION

KEYTRUDA is a medicine that may treat certain cancers by working with your immune system. KEYTRUDA can cause your immune system to attack normal organs and tissues in any area of your body and can affect the way they work. These problems can sometimes become severe or life-threatening and can lead to death. These problems may happen any time during treatment or even after your treatment has ended.

**Call or see your doctor right away if you develop any symptoms of the following problems or these symptoms get worse:**

- **Lung problems (pneumonitis).** Symptoms of pneumonitis may include shortness of breath, chest pain, or new or worse cough.
- **Intestinal problems (colitis) that can lead to tears or holes in your intestine.** Signs and symptoms of colitis may include diarrhea or more bowel movements than usual; stools that are black, tarry, sticky, or have blood or mucus; or severe stomach-area (abdomen) pain or tenderness.
- **Liver problems, including hepatitis.** Signs and symptoms of liver problems may include yellowing of your skin or the whites of your eyes, nausea or vomiting, pain on the right side of your stomach area (abdomen), dark urine, or bleeding or bruising more easily than normal.
- **Hormone gland problems (especially the thyroid, pituitary, adrenal glands, and pancreas).** Signs and symptoms that your hormone glands are not working properly may include rapid heartbeat, weight loss or weight gain, increased sweating, feeling more hungry or thirsty, urinating more often than usual, hair loss, feeling cold, constipation, your voice gets deeper, muscle aches, feeling very weak, dizziness or fainting, or headaches that will not go away or unusual headache.
- **Kidney problems, including nephritis and kidney failure.** Signs of kidney problems may include change in the amount or color of your urine.
- **Skin problems.** Signs of skin problems may include rash, itching, blisters, peeling or skin sores, or painful sores or ulcers in your mouth or in your nose, throat, or genital area.
- **Problems in other organs.** Signs and symptoms of these problems may include changes in eyesight; severe or persistent muscle or joint pains; severe muscle weakness; low red blood cells (anemia); swollen lymph nodes, rash or tender lumps on skin, cough, shortness of breath, vision changes,

*Important Safety Information is continued on the next page.*



Roger is a  
real patient

[keytruda.com/lung](https://www.keytruda.com/lung)

### IMPORTANT SAFETY INFORMATION (continued)

or eye pain (sarcoidosis); confusion, fever, muscle weakness, balance problems, nausea, vomiting, stiff neck, memory problems, or seizures (encephalitis); pain, numbness, tingling, or weakness in the arms or legs; bladder or bowel problems including needing to urinate more frequently, urinary incontinence, difficulty urinating, or constipation (myelitis); and shortness of breath, irregular heartbeat, feeling tired, or chest pain (myocarditis).

- **Infusion (IV) reactions that can sometimes be severe and life-threatening.** Signs and symptoms of infusion reactions may include chills or shaking, shortness of breath or wheezing, itching or rash, flushing, dizziness, fever, or feeling like passing out.
- **Rejection of a transplanted organ.** People who have had an organ transplant may have an increased risk of organ transplant rejection if they are treated with KEYTRUDA.
- **Complications, including graft-versus-host disease (GVHD), in people who have received a bone marrow (stem cell) transplant that uses donor stem cells (allogeneic).** These complications can be severe and can lead to death. These complications may happen if you underwent transplantation either before or after being treated with KEYTRUDA. Your doctor will monitor you for the following signs and symptoms: skin rash, liver inflammation, abdominal pain, and diarrhea.

**Getting medical treatment right away may help keep these problems from becoming more serious.** Your doctor will check you for these problems during treatment with KEYTRUDA. Your doctor may treat you with corticosteroid or hormone replacement medicines. Your doctor may also need to delay or completely stop treatment with KEYTRUDA if you have severe side effects.

**Before you receive KEYTRUDA, tell your doctor if you** have immune system problems such as Crohn's disease, ulcerative colitis, or lupus; have had an organ transplant or plan to have or have had a bone marrow (stem cell) transplant that used donor stem cells (allogeneic); have lung or breathing problems; have liver problems; or have any other medical problems.

If you are pregnant or plan to become pregnant, tell your doctor. KEYTRUDA can harm your unborn baby. If you are able to become pregnant, your doctor will give you a pregnancy test before you start treatment.

Use effective birth control during treatment and for at least 4 months after the final dose of KEYTRUDA. Tell your doctor right away if you think you may be pregnant or you become pregnant during treatment with KEYTRUDA.

If you are breastfeeding or plan to breastfeed, tell your doctor. It is not known if KEYTRUDA passes into your breast milk. Do not breastfeed during treatment with KEYTRUDA and for 4 months after your final dose of KEYTRUDA.

**Tell your doctor about all the medicines you take,** including prescription and over-the-counter medicines, vitamins, and herbal supplements.

Common side effects of KEYTRUDA when used alone include feeling tired; pain, including pain in muscles, bones, or joints and stomach area (abdominal pain); decreased appetite; itching; diarrhea; nausea; rash; fever; cough; shortness of breath; and constipation.

Common side effects of KEYTRUDA when given with certain chemotherapy medicines include feeling tired or weak; nausea; constipation; diarrhea; decreased appetite; rash; vomiting; cough; trouble breathing; fever; hair loss; inflammation of the nerves that may cause pain, weakness, and paralysis in the arms and legs; swelling of the lining of the mouth, nose, eyes, throat, intestines, or vagina; and mouth sores.

These are not all the possible side effects of KEYTRUDA. Tell your doctor if you have any side effect that bothers you or that does not go away. For more information, ask your doctor or pharmacist.

**Please read the adjacent Important Information About KEYTRUDA and discuss it with your oncologist.**

You are encouraged to report negative side effects of prescription drugs to the FDA. Visit [www.fda.gov/medwatch](https://www.fda.gov/medwatch) or call 1-800-FDA-1088.

Having trouble paying for your Merck medicine?

**Merck may be able to help. [www.merckhelps.com](https://www.merckhelps.com)**

**IT'S TRU. KEYTRUDA**  
(pembrolizumab) Injection 100 mg

---

**Important Information About KEYTRUDA® (pembrolizumab) injection 100 mg.** Please speak with your healthcare professional regarding KEYTRUDA (pronounced key-true-duh). Only your healthcare professional knows the specifics of your condition and how KEYTRUDA may work with your overall treatment plan. If you have any questions about KEYTRUDA, speak with your healthcare professional. **Rx ONLY**

---

**What is the most important information I should know about KEYTRUDA?**

KEYTRUDA is a medicine that may treat certain cancers by working with your immune system. KEYTRUDA can cause your immune system to attack normal organs and tissues in any area of your body and can affect the way they work. These problems can sometimes become severe or life-threatening and can lead to death. These problems may happen anytime during treatment or even after your treatment has ended.

**Call or see your doctor right away if you develop any symptoms of the following problems or these symptoms get worse:**

**Lung problems (pneumonitis).** Symptoms of pneumonitis may include:

- shortness of breath
- chest pain
- new or worse cough

**Intestinal problems (colitis) that can lead to tears or holes in your intestine.** Signs and symptoms of colitis may include:

- diarrhea or more bowel movements than usual
- stools that are black, tarry, sticky, or have blood or mucus
- severe stomach-area (abdomen) pain or tenderness

**Liver problems, including hepatitis.** Signs and symptoms of liver problems may include:

- yellowing of your skin or the whites of your eyes
- nausea or vomiting
- pain on the right side of your stomach area (abdomen)
- dark urine
- bleeding or bruising more easily than normal

**Hormone gland problems (especially the thyroid, pituitary, adrenal glands, and pancreas).** Signs and symptoms that your hormone glands are not working properly may include:

- rapid heart beat
- weight loss or weight gain
- increased sweating
- feeling more hungry or thirsty
- urinating more often than usual
- hair loss
- feeling cold
- constipation
- your voice gets deeper
- muscle aches
- feeling very weak
- dizziness or fainting
- headaches that will not go away or unusual headache

**Kidney problems, including nephritis and kidney failure.**

Signs of kidney problems may include:

- change in the amount or color of your urine

**Skin problems.** Signs of skin problems may include:

- rash
- itching
- blisters, peeling or skin sores
- painful sores or ulcers in your mouth or in your nose, throat, or genital area

**Problems in other organs.** Signs and symptoms of these problems may include:

- changes in eyesight
- severe or persistent muscle or joint pains
- severe muscle weakness
- low red blood cells (anemia)
- swollen lymph nodes, rash or tender lumps on skin, cough, shortness of breath, vision changes, or eye pain (sarcoidosis)
- confusion, fever, muscle weakness, balance problems, nausea, vomiting, stiff neck, memory problems, or seizures (encephalitis)
- pain, numbness, tingling, or weakness in your arms or legs, or bladder or bowel problems, including the need to urinate more often, leaking of urine, trouble urinating, or constipation (myelitis)
- shortness of breath, irregular heartbeat, feeling tired, or chest pain (myocarditis)

**Infusion (IV) reactions that can sometimes be severe and life-threatening.** Signs and symptoms of infusion reactions may include:

- chills or shaking
- dizziness
- shortness of breath or wheezing
- fever
- itching or rash
- feeling like passing out
- flushing

**Rejection of a transplanted organ.** People who have had an organ transplant may have an increased risk of organ transplant rejection. Your doctor should tell you what signs and symptoms you should report and monitor you, depending on the type of organ transplant that you have had.

**Complications, including graft-versus-host-disease (GVHD), in people who have received a bone marrow (stem cell) transplant that uses donor stem cells (allogeneic).** These complications can be severe and can lead to death. These

**Continued on next page.**

complications may happen if you underwent transplantation either before or after being treated with KEYTRUDA. Your doctor will monitor you for the following signs and symptoms: skin rash, liver inflammation, stomach-area (abdominal) pain, and diarrhea.

**Getting medical treatment right away may help keep these problems from becoming more serious.** Your doctor will check you for these problems during treatment with KEYTRUDA. Your doctor may treat you with corticosteroid or hormone replacement medicines. Your doctor may also need to delay or completely stop treatment with KEYTRUDA, if you have severe side effects.

### **What should I tell my doctor before receiving KEYTRUDA?**

**Before you receive KEYTRUDA, tell your doctor if you:**

- have immune system problems such as Crohn's disease, ulcerative colitis, or lupus
- have received an organ transplant, such as a kidney or liver
- have received or plan to receive a stem cell transplant that uses donor stem cells (allogeneic)
- have lung or breathing problems
- have liver problems
- have any other medical problems
- are pregnant or plan to become pregnant
  - KEYTRUDA can harm your unborn baby.

### **Females who are able to become pregnant:**

- Your doctor will give you a pregnancy test before you start treatment with KEYTRUDA.
- You should use an effective method of birth control during and for at least 4 months after the final dose of KEYTRUDA. Talk to your doctor about birth control methods that you can use during this time.
- Tell your doctor right away if you think you may be pregnant or if you become pregnant during treatment with KEYTRUDA.
- are breastfeeding or plan to breastfeed.
  - It is not known if KEYTRUDA passes into your breast milk.
  - Do not breastfeed during treatment with KEYTRUDA and for 4 months after your final dose of KEYTRUDA.

**Tell your doctor about all the medicines you take,** including prescription and over-the-counter medicines, vitamins, and herbal supplements.

Know the medicines you take. Keep a list of them to show your doctor and pharmacist when you get a new medicine.

### **How will I receive KEYTRUDA?**

- Your doctor will give you KEYTRUDA into your vein through an intravenous (IV) line over 30 minutes.
- In adults, KEYTRUDA is usually given every 3 weeks or 6 weeks depending on the dose of KEYTRUDA that you are receiving.
- In children, KEYTRUDA is usually given every 3 weeks.

- Your doctor will decide how many treatments you need.
- Your doctor will do blood tests to check you for side effects.
- If you miss any appointments, call your doctor as soon as possible to reschedule your appointment.

### **What are the possible side effects of KEYTRUDA?**

**KEYTRUDA can cause serious side effects. See “What is the most important information I should know about KEYTRUDA?”**

**Common side effects of KEYTRUDA when used alone include:** feeling tired, pain, including pain in muscles, bones or joints and stomach-area (abdominal) pain, decreased appetite, itching, diarrhea, nausea, rash, fever, cough, shortness of breath, and constipation.

**Common side effects of KEYTRUDA when given with certain chemotherapy medicines include:** feeling tired or weak, nausea, constipation, diarrhea, decreased appetite, rash, vomiting, cough, trouble breathing, fever, hair loss, inflammation of the nerves that may cause pain, weakness, and paralysis in the arms and legs, swelling of the lining of the mouth, nose, eyes, throat, intestines, or vagina, and mouth sores.

**Common side effects of KEYTRUDA when given with axitinib include:** diarrhea, feeling tired or weak, high blood pressure, liver problems, low levels of thyroid hormone, decreased appetite, blisters or rash on the palms of your hands and soles of your feet, nausea, mouth sores or swelling of the lining of the mouth, nose, eyes, throat, intestines, or vagina, hoarseness, rash, cough, and constipation.

In children, feeling tired, vomiting and stomach-area (abdominal) pain, and increased levels of liver enzymes and decreased levels of salt (sodium) in the blood are more common than in adults.

These are not all the possible side effects of KEYTRUDA. For more information, ask your doctor or pharmacist.

Tell your doctor if you have any side effect that bothers you or that does not go away.

Call your doctor for medical advice about side effects. You may report side effects to FDA at 1-800-FDA-1088.

### **General information about the safe and effective use of KEYTRUDA**

Medicines are sometimes prescribed for purposes other than those listed in a Medication Guide. If you would like more information about KEYTRUDA, talk with your doctor. You can ask your doctor or nurse for information about KEYTRUDA that is written for healthcare professionals. For more information, go to [www.keytruda.com](http://www.keytruda.com).

Based on Medication Guide usmg-mk3475-iv-2006r032 as revised June 2020.

Copyright © 2020 Merck Sharp & Dohme Corp., a subsidiary of Merck & Co., Inc. All rights reserved. US-LAM-01022 08/20



# A Letter to My Generation

We're entering adulthood in the shadow of COVID-19, economic and social upheaval, and climate change. We don't really feel like Gen Z or millennials—and some like to call us Generation Screwed. We say: Don't underestimate our ability to overcome.

BY

**JORDAN SALAMA**


● PHOTOGRAPHS BY JACKIE RUSSO

**WHO KNEW THAT** stay-at-home orders could bring so much displacement?

That's how the spring of 2020 felt for many in our generation—we who were just starting to get a glimpse of independence and adulthood before the pandemic came crashing down.

Maybe we need a name, those of us who are currently 18 to 25 years old, instead of remaining just a purgatorial generation: feeling like we're too young to be millennials but not young enough for Gen Z. I'm not sold on any of the names I've heard us called—Rainbow Generation, zillennials, Generation

Screwed. Yet the unavoidable fact is that we're at a critical turning point in our personal lives at a time when the world seems to be imploding in so many ways.

As lockdowns were spreading earlier this year, hardly any of us seemed to stay where we were, racing instead to seek safer ground. I know where many friends sought refuge, because I've spent much of my time in quarantine writing letters—the classic long, handwritten letters—and that meant gathering mailing addresses.

I've kept track of which friends fled as college campuses emptied. I knew

Charlie Coburn—here with Amy Hudson in his San Francisco apartment—wrote in June that “I feel more called to action than I have at perhaps any other point in my life.”



# Your antioxidant armor.

Protect thyself in the fight against free radicals. With more antioxidant power on average than red wine, blueberry juice, or green tea, POM Wonderful 100% Pomegranate Juice is your body's knight in shining armor.



Kasia Vargo finished nursing school during the height of the pandemic.

who left their first real apartments to move back into their childhood bedrooms, who was locked down in the mountains or by the beach, and whose socioeconomic backgrounds gave them no choice but to stay in cities hit hard by the plague. I knew whose jobs were safe, whose siblings needed looking after, and whose boyfriends and girlfriends were suddenly an agonizing distance away. What few seemed to realize at first was how long it would last and how normal it would become.

My pen pals knew where I was too. They knew that when my dad, an infectious-disease doctor at Elmhurst Hospital in Queens, N.Y., saw what was coming, we'd decided it would be safer for our family to stay apart for a while. That I'd left New York with my college-age brothers, my mother, and my ailing grandmother and hunkered down in North Carolina. That the guilt we felt not being by my father's side was overpowering, and we missed him tremendously.

- **IN THE LETTERS** my friends and I exchanged, we shared those

1. When 2020 university grad Elle O'Brien surveyed her peers on Instagram, 91% said they "feel anxious or stressed about how COVID-19 has impacted our post-grad plans and jobs."

kinds of thoughts and feelings—sentiments that weren't expressed in texts or on group Zoom calls (which we still used, of course). Something about writing a letter seemed to draw out emotions and vulnerabilities in a way that many of us hadn't really experienced before. And suddenly there was so much to feel.

Depending on our circumstances, the tone of letters ranged from anxious to reflective, fearful to calm, frustrated to stirred. Friends wrote of their greatest prides, such as a brother graduating early from medical school to join the front lines of the pandemic—and of unexpected joys, like rediscovering a passion for books, which had been lost amid schedules and screens.

Standing by the mailbox one afternoon, I had the heartbreaking experience of learning bad news by mail for the first time. "My grandparents (mom's side) are both in the hospital with COVID, sadly," my friend wrote. (A few weeks later her grandparents died, just hours apart from each other.)

As the pandemic wave washed over the United States, it became clear that the undertow was dragging people our age out to sea. Many were already struggling: wracked by debt from paying \$20,000, \$40,000, \$60,000 a year for school. Priced out by the sky-high rents in major American cities. Exasperated by years of speaking out against systemic racism and gun violence and climate change, only to find corrupt and destructive politicians unwilling to act. The pandemic ripped the ground out from under all of us.

We are, after all, a generation raised on post-9/11 dread and active-shooter drills in our elementary schools. If the future of the world looked grim to us before, what might it hold now?

New uncertainties hang over what should be everyday experiences—living on our own, going back to school, going on dates, hugging our grandparents. It seems to be all we're talking about these days, the pounding of the waves deafening, dominating every conversation.

- **SO ALTHOUGH SOME** like to call us Generation Screwed—and sometimes it might feel that way—I think that's too negative. We've been battered and shaken up, but we're certainly not going down easy.

"This is just not what we thought life would look like," says Elle O'Brien, a recent Colgate University graduate. She's used social media to survey people (many of them our age) about their feelings and experiences during the pandemic. (1) For several months, starting in April, O'Brien posted survey questions on her Instagram and blogged about the results. Hundreds of people took her surveys, O'Brien wrote, and she was struck by the similarities: "We're a complicated mix of scared and hopeful, a lot of us laughing in the same days we're crying." Here's how O'Brien described our generation's bottom line to me: "It's a s\*\*\*\*y hand we've been dealt. But we're speaking up."

On all those counts, I think O'Brien represents how



HIGH PROTEIN.  
FULL FLAVOR.  
NATURAL NUTRITION  
AS IT SHOULD BE.



THE CHOW® IS HOW  
REAL CHICKEN #1

EARN REWARDS  CATCHOW.COM

Trademarks owned by Société des Produits Nestlé S.A., Vevey, Switzerland.

 **PURINA**

Your Pet, Our Passion.®

we're feeling. A movement is beginning, and in my circles, at least, it's no longer acceptable to stay silent. Ironically, it took months of social distancing to help spark this remarkable level of engagement in society, especially among young people.

Such large and diverse crowds of young adults joined the protests of the killing of George Floyd in part because of what the pandemic was revealing about the systemic inequalities in our country. We saw Black friends and classmates whose family members were disproportionately falling ill from the coronavirus. We saw first-generation and lower-income students struggling more with the transition to virtual learning. We saw recent graduates of color lacking the resources and connections to succeed in an increasingly uninviting job market. How could we *not* seek change?

Humanity is in for a similarly urgent reckoning, I suspect, about the consequences of mistreating our planet. As the virus does now, the global climate emergency has long alarmed our generation. Maybe the label Generation Climate Change fits us, as it's the greatest existential threat to us all. By comparison, previous generations failed to act with urgency about melting glaciers, polluted air, slaughtered rainforests, rising seas—perhaps because they're not the ones who'll have to live in that world.

The devastation from this pandemic was once unfathomable. But it likely pales in comparison with the environmental catastrophes to come.

The weight of all these matters was apparent in a June letter from one of my college roommates. "I am sad. I am conflicted. I am frustrated and upset, as much with myself and my own complicity/inaction as anything else," Charlie Coburn wrote. After he'd spent months holed up in silence, something in him was boiling over. "I'm furious with the response of the federal government," he wrote. "And I feel more called to action than I have at perhaps any other point in my life." (2)

● **IN MY OWN LETTERS** to friends early in the quarantine, I wrote about a young whale that washed up on the North Carolina coast not far from where we were



Fedjounie Philippe, an immigrant from Haiti and 2020 Princeton University graduate, was the first in her family to attend college.



PHOTO: JORDAN SALAMA

2. About 41% of Americans who said they recently attended a protest focused on race are younger than 30, according to June survey data reported by the Pew Research Center.

staying. Its death was likely humans' fault, a boat strike or a net tangling. Because the virus kept most tourists off the beach, the buried carcass was left there, and nature had its way.

On my regular beach walks I observed the changes to the whale's spine, the only part protruding from the sand. One week it was covered in buzzing black flies. A few days later it had been scavenged by coyotes, judging from the fresh tracks. And then, after what felt like a world-ending storm—the house shook, the winds howled, the rains flooded the beach grass—I found that the pounding waves had revealed a clean vertebra

(at left) for the taking.\* Through the weeks of lockdown, I scrubbed and polished the bone. I keep it as a reminder of the pandemic—of the uprooting it caused, of the many lonely and untimely deaths, of the natural world and our place in it.

For those of us at the beginning of our adult lives, the faltering start caused by the pandemic means that our choices will matter even more. We need reminders so we don't forget what it felt like: Some suffered far more than others, but all of us were plunged into a period of questioning, of reevaluating, of trial.

It's only natural at times to feel as though we're Generation Screwed—but I want to think that we're shaping up to be Generation Renewed. We will not go down without a fight. And what will define us far more than our struggles in this moment is what we'll do when we come out the other side.

All my best,  
Jordan

**Jordan Salama** is a writer whose work has appeared in the *New York Times*, *National Geographic*, *Smithsonian*, and more. His first book, *Every Day the River Changes*, a journey down the Magdalena River in Colombia, will be published by Catapult in 2021.

\*AS REQUIRED BY LAW, SALAMA CONTACTED THE U.S. MARINE MAMMAL STRANDING PROGRAM ABOUT THE VERTEBRA HE FOUND. HE REGISTERED THE SPECIMEN AND WAS TOLD HE COULD KEEP IT BECAUSE THE WHALE IS NOT ON THE LIST OF SPECIES WHOSE BONE POSSESSION IS PROHIBITED.

**Make your home more comfortable than ever**

“To you, it’s the **perfect lift chair**.  
To me, it’s the **best sleep chair** I’ve ever had.”

— J. Fitzgerald, VA

**NOW**  
also available in  
**Genuine Italian Leather**  
(and new Chestnut color)



**Pictured:** Italian Leather chair chestnut color. Chestnut color also available in Duralux™ fabric

**You can’t always lie down in bed and sleep. Heartburn, cardiac problems, hip or back aches – and dozens of other ailments and worries.** Those are the nights you’d give anything for a comfortable chair to sleep in: one that reclines to exactly the right degree, raises your feet and legs just where you want them, supports your head and shoulders properly, and operates at the touch of a button.

Our **Perfect Sleep Chair®** does all that and more. More than a chair or recliner, it’s designed to provide total comfort. **Choose your preferred heat and massage settings, for hours of soothing relaxation.** Reading or watching TV? Our chair’s recline technology allows you to pause the chair in an infinite number of settings. And best of all, it features a powerful lift mechanism that tilts the entire chair forward, making it easy to stand. You’ll love the other benefits, too. It helps with correct spinal alignment and promotes back pressure relief, to prevent back

and muscle pain. The overstuffed, oversized biscuit style back and unique seat design will cradle you in comfort. Generously filled, wide armrests provide enhanced arm support when sitting or reclining. **It even has a battery backup in case of a power outage.**

**White glove delivery** included in shipping charge. Professionals will deliver the chair to the exact spot in your home where you want it, unpack it, inspect it, test it, position it, and even carry the packaging away! You get your choice of Genuine Italian leather, stain and water repellent custom-manufactured DuraLux™ with the classic leather look or plush MicroLux™ microfiber in a variety of colors to fit any decor. **New Chestnut color only available in Genuine Italian Leather and long lasting DuraLux™. Call now!**

**The Perfect Sleep Chair®**  
**1-888-648-9638**

Please mention code 113814 when ordering.

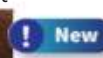
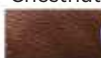


**REMOTE-CONTROLLED**  
EASILY SHIFTS FROM FLAT TO  
A STAND-ASSIST POSITION

Footrest may vary by model

**Genuine Italian Leather**  
*classic beauty & durability*

Chestnut

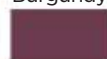


**Long Lasting DuraLux™**  
*stain & water repellent*

Chestnut



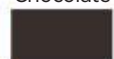
Burgundy



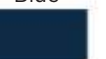
Tan



Chocolate

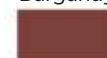


Blue



**MicroLux™ Microfiber**  
*breathable & amazingly soft*

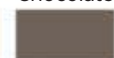
Burgundy



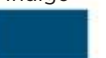
Cashmere



Chocolate

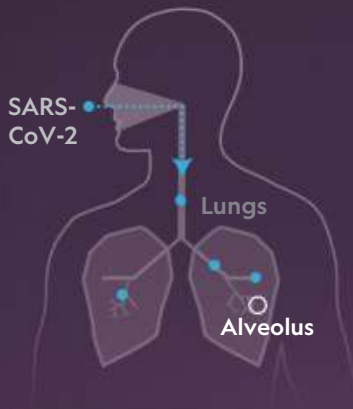


Indigo



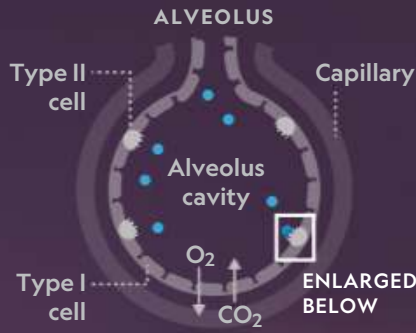
Because each Perfect Sleep Chair is a custom-made bedding product, we can only accept returns on chairs that are damaged or defective.

© 2020 firstSTREET for Boomers and Beyond, Inc.



## VIRAL INVASION

Coronavirus spreads mainly through respiratory particles in the air. Infection occurs in the nasal passage and can travel to the deepest part of our lungs, the alveoli.



Responsible for the exchange of oxygen and carbon dioxide in the blood, the alveoli are ground zero for the virus's attack on our cells (#1 below).

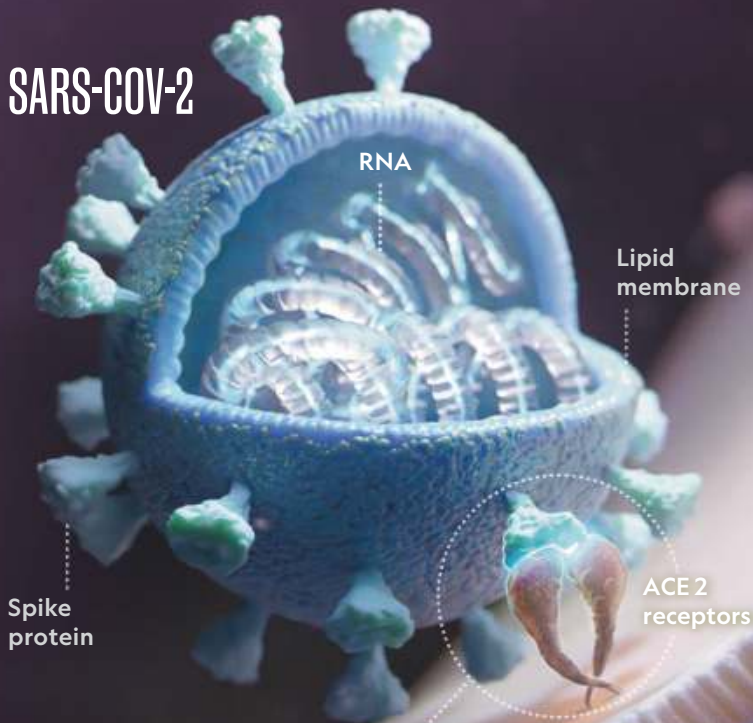
32

# HOW IT ATTACKS

BY **MANUEL CANALES & ALEXANDER STEGMAIER**

Experts are still trying to decode how the novel coronavirus infiltrates the body and how the immune system can overreact—with deadly consequences. Here's how an infection can begin: SARS-CoV-2, the virus that causes COVID-19, targets ACE-2 proteins that line the surface of many important human cells, including type II alveolar cells in the lungs.

## SARS-COV-2



**1 Gains entry**  
Like a key in a lock, the coronavirus uses its unique, crown-shaped spike protein to infiltrate a cell and replicate.

### INSIDE THE CELL

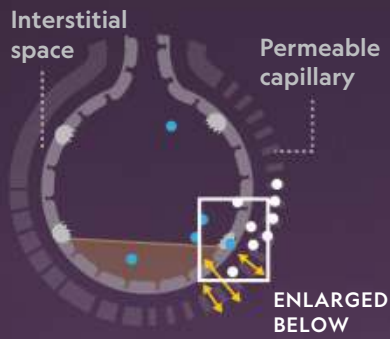
**4 Builds an army**  
Particles are reassembled into more virus and released back into the alveolus cavity; host cells are destroyed.

**3 Takes command**  
The virus hijacks the host cell and forces it to create copies of its biological code.

**2 Trips the alarms**  
The cell alerts the immune system to call for help. But experts believe the virus may suppress these distress signals.

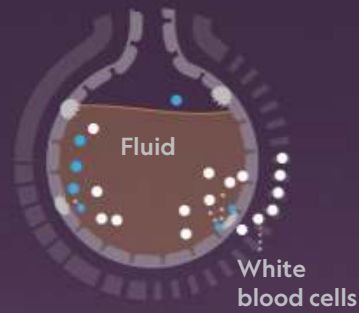
RNA is released.

TYPE II ALVEOLAR CELL MEMBRANE



## BODY RESPONSE

Fluid builds up in the lungs as the body defends itself (#5 below), resulting in shortness of breath and pneumonia. The virus continues to attack more cells.



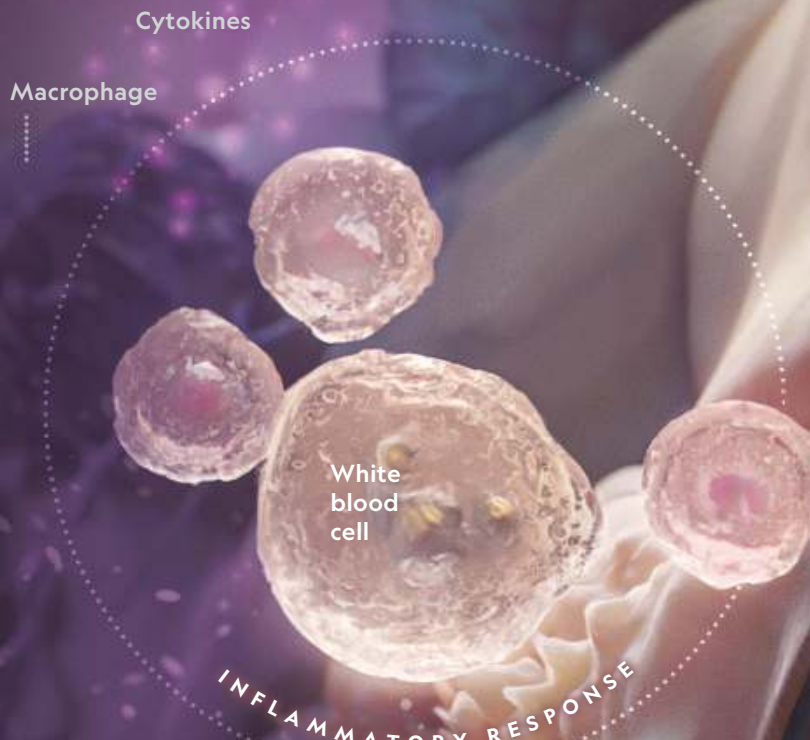
Alveolar damage and excess inflammation can lead to acute respiratory distress syndrome, abnormal blood clotting, organ failure, and death.

### INSIDE THE ALVEOLUS CAVITY

**5 Provokes a defense**  
Immune cells known as macrophages release cytokines, proteins that dilate blood vessels and recruit virus-fighting cells.

TYPE II ALVEOLAR CELL

**6 Faces resistance**  
An influx of white blood cells attacks infected and healthy cells, causing inflammation.



The cavity fills with fluid and debris, impairing lung function.

TYPE I ALVEOLAR CELL

INTERSTITIAL SPACE  
PERMEABLE CAPILLARY

White blood cell

Blood plasma

Weakened blood vessels leak plasma into the interstitial space, further stressing the alveoli.

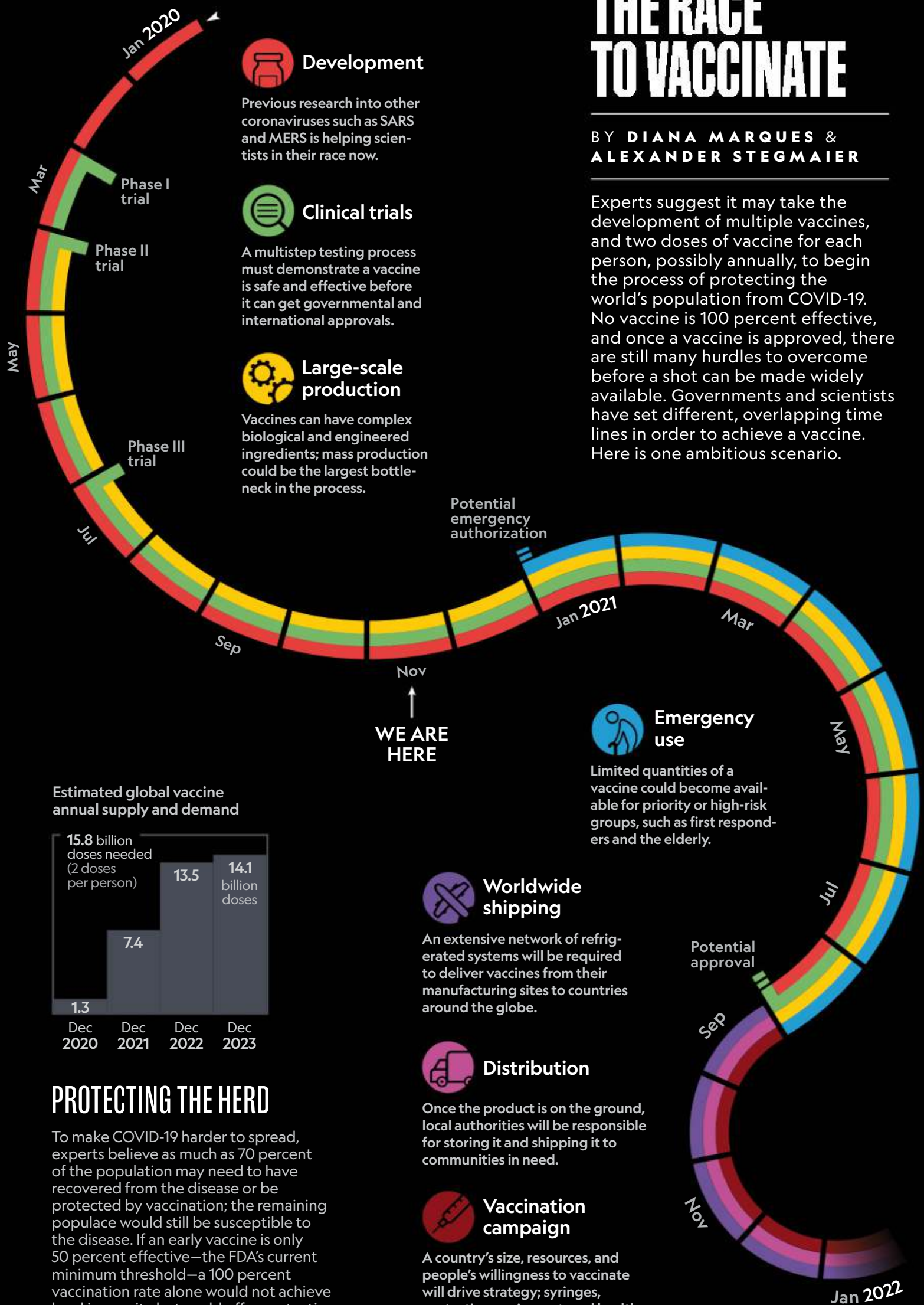
**7 Scrambles the system**  
In severe cases the immune system overreacts, contributing to multi-organ failure and septic shock.

TAYLOR MAGGIACOMO AND EVE CONANT, NGM STAFF. ART: ANTOINE COLLIGNON  
SOURCES: HOWARD M. HELLER, HARVARD MEDICAL SCHOOL; DANIEL S. CHERTOW, NIH CLINICAL CENTER AND NIH NIAID

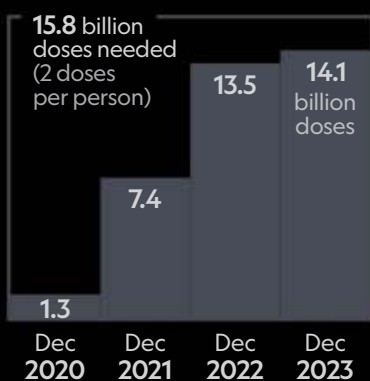
# THE RACE TO VACCINATE

BY DIANA MARQUES & ALEXANDER STEGMAIER

Experts suggest it may take the development of multiple vaccines, and two doses of vaccine for each person, possibly annually, to begin the process of protecting the world's population from COVID-19. No vaccine is 100 percent effective, and once a vaccine is approved, there are still many hurdles to overcome before a shot can be made widely available. Governments and scientists have set different, overlapping time lines in order to achieve a vaccine. Here is one ambitious scenario.



Estimated global vaccine annual supply and demand



## PROTECTING THE HERD

To make COVID-19 harder to spread, experts believe as much as 70 percent of the population may need to have recovered from the disease or be protected by vaccination; the remaining populace would still be susceptible to the disease. If an early vaccine is only 50 percent effective—the FDA's current minimum threshold—a 100 percent vaccination rate alone would not achieve herd immunity but could offer protection from more severe impacts of the virus.

DATA AS OF AUGUST 2020

SOURCES: PRASHANT YADAV, CENTER FOR GLOBAL DEVELOPMENT AND INSEAD; MARGARET A. LIU, INTERNATIONAL SOCIETY FOR VACCINES; JOHN J. DONNELLY, VACCINOLOGY CONSULTING, LLC.; UNICEF; WHO



# IF IT'S NOT ROBITUSSIN, IT'S NOT REAL HONEY.

## Robitussin<sup>®</sup> Honey

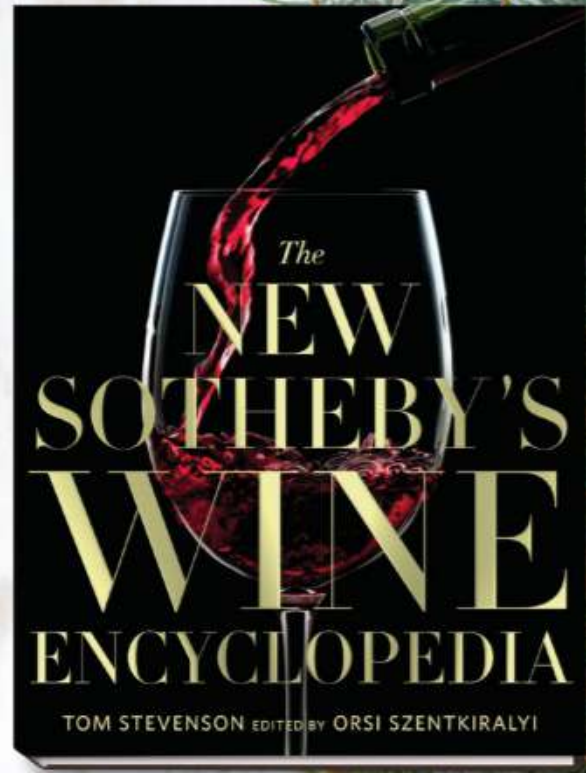
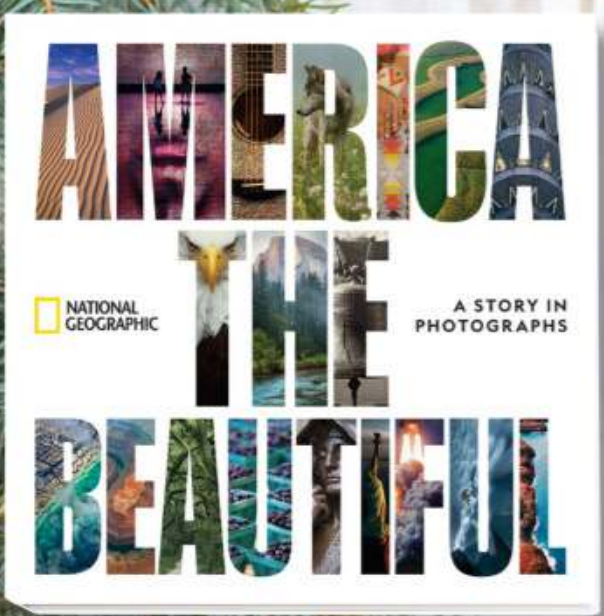
Robitussin Honey is the only brand made with real, True Source Certified Honey.\* For multi-symptom relief, try **NEW** Robitussin Honey Severe.



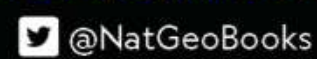
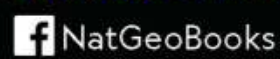
\*Among leading brands. Real Honey. Fake Bear. Use as directed. ©2020 GSK group of companies or its licensor.



# I GREAT HOLIDAY GIFTS



AVAILABLE WHEREVER BOOKS ARE SOLD



© 2020 National Geographic Partners, LLC





The crown from Larry Hammond's 2007 reign as Zulu king rests on a chair at his New Orleans home.



# What COVID-19 Took From This Black Community

Across the United States the virus has been disproportionately deadly to African Americans. In New Orleans that meant the loss of a family man, fraternity brother, church usher, and youth mentor who was also a king of the Krewe of Zulu at Mardi Gras. This is Larry Hammond's story.

BY

WILL SUTTON

37

**FROM THE TIME** they began dating, Lillian Phillips realized Larry Hammond was different from other boys she knew in their New Orleans high schools. “He had charisma,” she says. “He was always there. He was always kind.”

Lillian and Larry married, had a family, and built friendships. Just as in high school, Larry joined group after group, including the Zulu Social Aid and Pleasure Club, a community organization whose Krewe of Zulu members and floats have appeared in Mardi Gras parades for more than a century.

The Larry Hammond that I and many others came to know over decades was the same man Lillian met in high school: charismatic, helpful, kind. He was like that through 47 years of marriage: In June the two planned to celebrate their 48th wedding anniversary.

That didn't happen.

Lillian Phillips Hammond lost the man of her dreams to COVID-19 on March 31. Larry's sudden death shook Lillian, their family, and the village that surrounded Larry, 70, a retired post office employee.

Lillian can't believe Larry's gone. And she's saddened that COVID-19 is taking the lives of so many African Americans.

But like others in Black communities, Lillian Hammond knows that we've been particular targets of the virus based on underlying conditions such as hypertension and diabetes.

A highly respected, personally admired member of the Krewe of Zulu, Larry served as Zulu king in 2007. Early in the pandemic, on the heels of Mardi Gras, several members of the krewe fell ill. Then Larry did.

Within a matter of weeks, COVID-19 caused the deaths of several of Larry's fellow Zulu members, the leader of Larry's cherished fraternity chapter, and Larry himself.

New Orleans city councilman Jay Banks, a former Zulu king and one of Larry's Omega Psi Phi Fraternity brothers, has seen too many friends get sick and die. Earlier this year, Banks told me he knew at least a dozen Black people who had died. A few weeks later, the number was 30.

**“THE STATISTICS ARE REAL.** The fact that this disease is disproportionately affecting people in our community cannot be

# ADVANCED DIGITAL HEARING AID TECHNOLOGY

## Now Rechargeable!

**BUY 1 GET 1 FREE** Reg: \$599.98<sup>+</sup>  
**Only \$299<sup>99</sup>**  
Each When You Buy a Pair – **LIMITED TIME ONLY!**

### How can a rechargeable hearing aid that costs only \$299<sup>99</sup>

be every bit as good as one that sells for \$2,400 or more?

**The answer:** Although tremendous strides have been made in Advanced Digital Hearing Aid Technology, those cost reductions have not been passed on to you. Until now...

**The MDHearingAid® VOLT** uses the same kind of Advanced Digital **RECHARGEABLE** Hearing Aid Technology incorporated into hearing aids that cost thousands more at a small fraction of the price.

Over 350,000 satisfied MDHearingAid customers agree: High-quality, digital, FDA-registered **rechargeable** hearing aids don't have to cost a fortune. The fact is, you don't need to spend thousands for a hearing aid. MDHearingAid is a medical-grade digital rechargeable hearing aid offering sophistication and high performance, and works right out of the box with no time-consuming "adjustment" appointments. You can contact a licensed hearing specialist conveniently online or by phone — even after your purchase at no cost. No other company provides such extensive support. Now that you know... why pay more?

**MDHearingAid®** >>>  
DOCTOR DESIGNED | AUDIOLOGIST TESTED | FDA REGISTERED



**SHOP AT HOME!**  
Skip the Clinic with Remote Care

*"I was amazed! Sounds I hadn't heard in years came back to me!"*

— Don W., Sherman, TX

**CHARGE** AT NIGHT **AND GO** ALL DAY



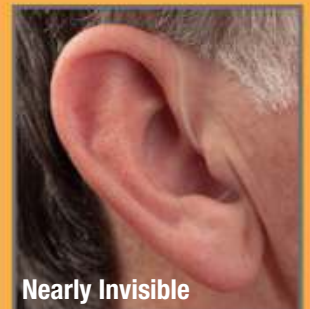
CHARGING READY

### 45-DAY RISK-FREE TRIAL!

If you are not completely satisfied with your MDHearingAids, return them within 45 days for a FULL REFUND!

For the Lowest Price Call  
**1-800-450-1705**

[www.MDVolt.com](http://www.MDVolt.com)



Use Code **KG32**  
and get **FREE** Shipping

Proudly assembled in America!



disputed,” Banks told a radio audience in the weeks after Larry’s death.

Across the United States, Black people have suffered high rates of COVID-19 sickness and death. Nationally, some sources say we’re 2.5 times as likely to die from COVID-19 as our white counterparts. (1)

In Louisiana, many were shocked when spring data showed that more than 70 percent of the state’s deaths from COVID-19 were among African Americans. That share of deaths subsequently fell below 60 percent—but in a state where nearly 33 percent of the population is Black, that’s far too high.

● **LARRY LOVED NEW ORLEANS, and the city loved him back.** His funeral service at Boyd Family Funeral Home was limited to 10 people. Those who couldn’t attend gathered at a shopping center not far from the Hammond home. On cue, we formed a procession and drove by the house in a slow-moving motorcade, expressing our sympathies with glances, waves, and honks. We were his Omega fraternity brothers and his fellow alumni of L.B. Landry High School, his fellow youth mentors of the Silverback Society, his fellow members of Beautiful Zion Baptist Church, and many other friends and admirers.

Those viewing the procession from the lawn included his widow, Lillian; his daughter, Nicole Hammond Crowden; his granddaughter, Kailyn Hammond Gouch, whom he called “K”; his brother Barry Hammond, and niece Dominique Irvin. As we drove by, they waved at each of us, drying tears, laughing and shouting as they saw familiar faces. “We would think it was over, and more cars would come by,” Irvin said. “There were hundreds. I don’t think we knew how much he meant to so many people.”

If times were normal, there might have been thousands. Larry was a king, from his days playing the lead role in his high school production of *The King and I* to his final days. There’ve been only about 100 Zulu kings in the group’s history, and a departing king gets a royal send-off. A jazz procession. Festive regalia. A second line, a uniquely New Orleans celebratory parade at parties, weddings, and funerals.

We would have heard funny stories



Larry Hammond’s widow, Lillian (center), and other relatives flanked his portrait at a drive-by funeral procession for him.

and remembrances about Larry. We would have laughed and cheered. I can imagine Larry looking on with a smile. There would’ve been lots of waved handkerchiefs, initially to dry tears and then to pierce the air with joy for his life. It was the life of a family man—a husband, a father, an uncle, a grandfather. His actions were those of a patriot, a believer, a hard worker, an advocate. He graduated from Our Lady of Holy Cross College. He served in the U.S. Air Force. He worked many years for the U.S. Postal Service before retiring. Then he did even more with groups such as the Silverbacks, who mentor boys in the community as they become young men.

Larry’s spirit was evident to all who met him, and in his home in New Orleans’ Algiers neighborhood. He cherished his relationships with different groups, proudly wearing their colors. On any given day, his family knew what he’d be doing based on what he chose to wear. A Beautiful Zion or Silverback Society shirt. An Omega jacket. A Zulu cap. The mementos fill the home, reminders of what Larry considered essential: friendship, scholarship, perseverance; helping and uplifting others.

As 2020 nears its end with the pandemic on an uncertain course, we can honor Larry Hammond and all he stood for by demanding equality in the COVID-19 response. We can work to eliminate disparities in health-care access, to get more Black youth into health-care careers, and to combat the causes of African Americans’ disproportionately high death rates.

That would be a fitting send-off for this king of a man—not a COVID-19 statistic, but an example of what’s best in our community. □

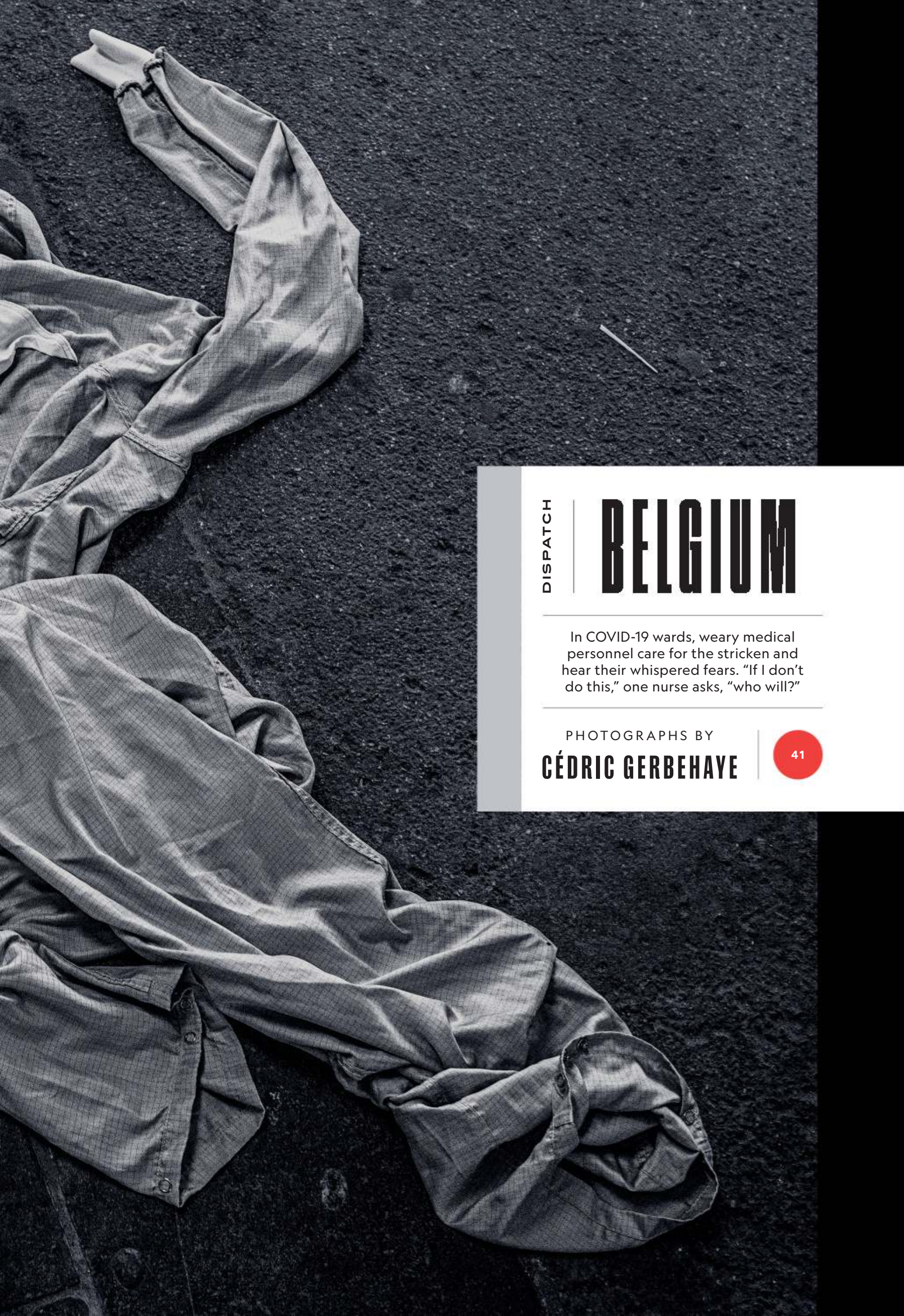
1. Halfway through 2020, the COVID-19 death rates in the U.S. for Hispanic and Black people were higher than the rates for white and Asian people in all age groups, according to CDC data.

New Orleans native **Will Sutton** is a columnist at his city’s newspaper *The Times-Picayune | The Advocate* and a life member of Omega Psi Phi Fraternity. **Max Aguilera-Hellweg** is a photographer and a medical doctor; he attended medical school at Tulane University and loves New Orleans and gumbo.



Stethoscope, visor, body suit: These pandemic essentials were discarded outside a hospital in La Louvière, Belgium, by a doctor who stripped them off between ambulance and emergency room—an effort to avoid new contamination.

CÉDRIC GERBEHAYE'S WORK WAS SUPPORTED IN PART BY THE NATIONAL GEOGRAPHIC SOCIETY'S COVID-19 EMERGENCY FUND FOR JOURNALISTS.



DISPATCH

# BELGIUM

In COVID-19 wards, weary medical personnel care for the stricken and hear their whispered fears. "If I don't do this," one nurse asks, "who will?"

PHOTOGRAPHS BY

**CÉDRIC GERBEHAYE**

41



The toll of pandemic work shows in this technician's shielded face as he helps prepare a patient for a CT scan at a hospital in La Louvière. For a while last spring, Belgium registered the world's highest per capita



COVID-19 death rate—resulting in more than 9,000 fatalities by late May, in a nation of 11.7 million. The spread was curtailed, but midsummer numbers showed a worrisome new surge.

BY CYNTHIA GORNEY

**CÉDRIC GERBEHAYE** dressed as advised by the medical workers around him: face mask, face shield, body suit, double bags over his shoes, double gloves over his hands. The outer gloves were plastic, taped to seal out virus. He learned to hold and work his camera through plastic. In a Brussels nursing home he watched an aged woman look into the eyes of the nurse who had come to test her for COVID-19. “*J’ai peur*,” the woman said.

The nurse took her hands, leaned in close, and said: I’m scared too. She and her team were testing nearly 150 people on that day alone. When she turned to Gerbehaye afterward, her voice was thick in a way that stays with him still; she sounded broken, tough, grieving, and furious, all at once. “No one else can come close to these people,” she said. “If I don’t do this, who will?”

Gerbehaye is 43, the grandson of Belgian and Dutch survivors of the Second World War. It is not uncommon for him, as a photojournalist, to stand in the presence of armed conflict and death. But as he lingered last spring inside hospitals, eldercare facilities, and corpse-transport vans, Gerbehaye understood that Belgians of his generation were witnessing for the first time, as their grandparents had, their own nation in crisis and afraid.

*J’ai peur*. Belgium’s pandemic numbers were famous for a few March and April weeks, when the country’s per capita COVID-19 fatality rate looked to be the highest in the world. Were Belgian authorities simply counting more honestly, as some contended, than everyone else? In any case the casualties Gerbehaye saw, as he followed undertakers and hospital staff in Brussels and two smaller cities, were also among the living: women and men at the front, caring for the stricken, improvising, overwhelmed.

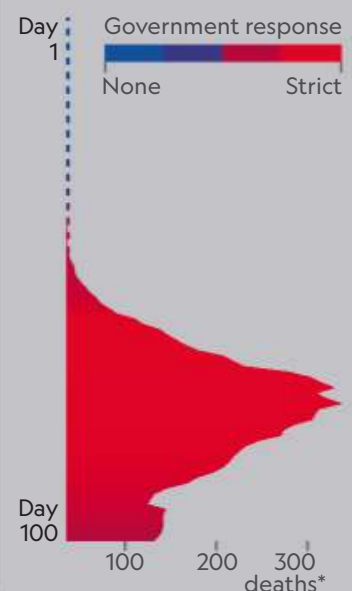
Outside a hospital in Mons two nurses sat near him one afternoon, silent, slumped, smoking cigarettes on their break. When one rested her head on the other’s shoulder, Gerbehaye thought of the phrase *faire corps*, which literally means make a body, join together as one. They reminded him of small animals curling into each other for warmth. I have seen your sisters at clinics in Gaza after bombings, he said to himself; like them you’re part of history, even though you’re too tired to care. He raised his camera. The nurses did not look up. □

After trying to explain obligatory COVID-19 testing to a frightened nursing home resident in La Louvière, a nurse reluctantly restrains him for the test. One reason offered for Belgium’s high death rate: Many elderly patients who died without formal COVID-19 diagnosis or treatment were counted as pandemic fatalities anyway.



## OUTBREAK RESPONSE

Belgium’s COVID-19 outbreak dates from February 4, when its first confirmed case was reported. A stay-at-home order was issued on day 44. By day 100, 8,918 deaths had been recorded.



\*SEVEN-DAY AVERAGE

TAYLOR MAGGIACOMO AND IRENE BERMAN-VAPORIS, NGM STAFF. SOURCES: OXFORD COVID-19 GOVERNMENT RESPONSE TRACKER; EUROPEAN CENTRE FOR DISEASE PREVENTION AND CONTROL







Half-swallowed by a machine on which her life depends, a cancer patient receives radiation therapy in La Louvière. In Belgium as in many countries, some hospitals closed during the first pandemic surge to



all except urgent patients—increasing risk and complications for other illnesses. This woman learned, after her cancer diagnosis, that her body was also fighting COVID-19.



---

**LEFT:** Hours of work in a protective mask mark a transient scar down the face of Yves Bouckaert, the chief intensive care unit physician at Tivoli Hospital in La Louvière.

**BELOW:** An emergency room doctor on a house call in La Louvière, deciding his patient may have COVID-19, summons an ambulance to get her to the hospital.

**BOTTOM:** A nurse disinfects her gear between patients. Like other countries, Belgium struggled to provide medical workers enough COVID-19 protective equipment.





After transporting the body of a COVID-19 fatality from the hospital to a hearse in La Louvière, an exhausted undertaker gets a disinfectant spray-down from his partner before they proceed to the



next job. Protecting their older colleagues, who are generally more vulnerable to the disease, these younger undertakers were working 24-hour pandemic shifts.



As the pandemic swelled and the medical staff at Tivoli Hospital in La Louvière struggled to keep up, a special pediatric emergency room—its walls cheerful with characters from children’s animated





movies—was commandeered for COVID-19 work. These undertakers are completing preparations to carry away the body of a patient who didn't survive the virus.

JUSTICE



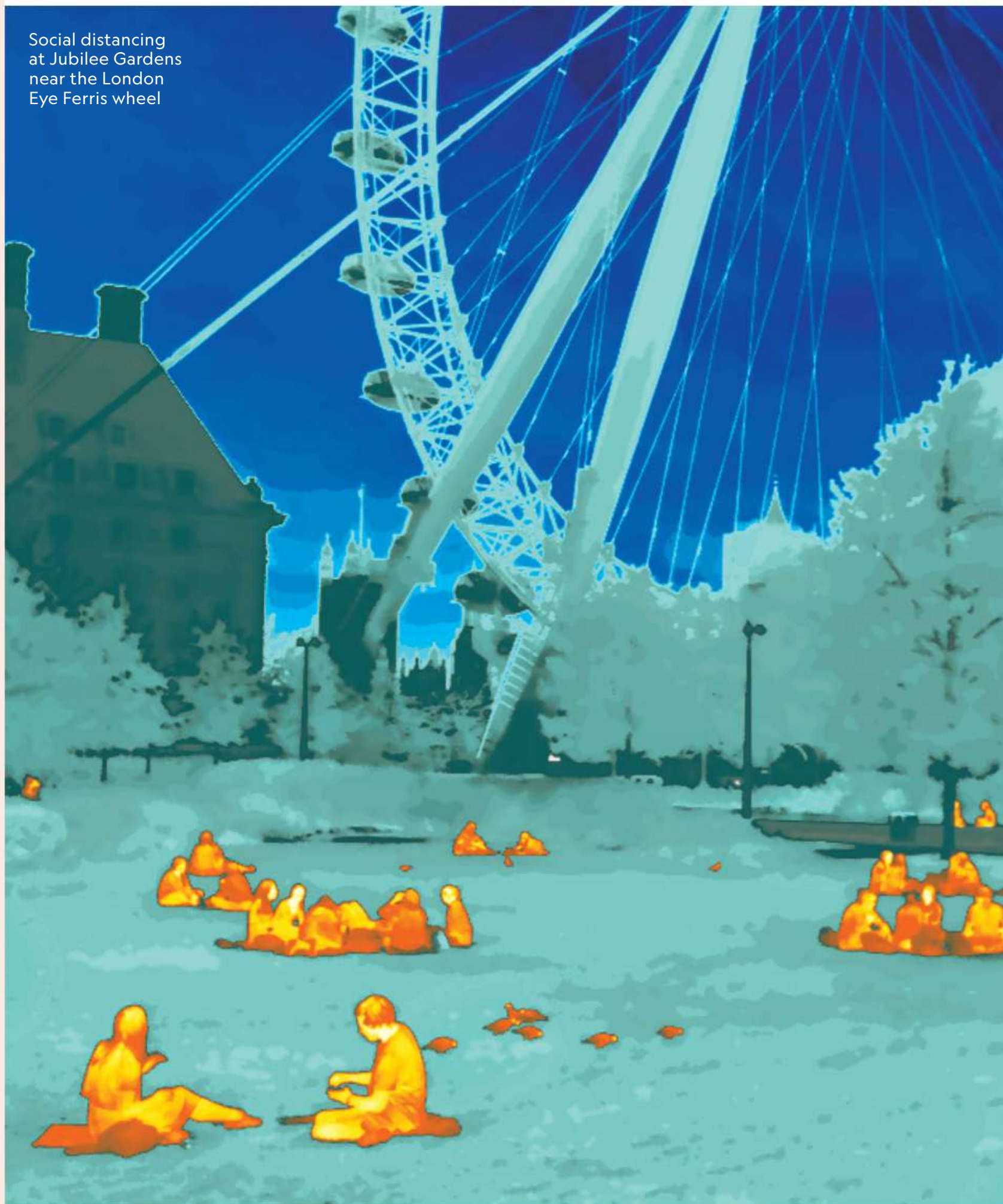
In Mons, Belgium, nursing colleagues take brief refuge in a shift break and each other's company. Like medical facilities around the world, Belgian hospitals were initially overwhelmed by the rush of



patients with a virulent new disease. These nurses, pulled from their standard duties, were thrown into full-time COVID-19 work—reinforcement troops for a long, exhausting battle.

# In Science We Must Trust

Social distancing  
at Jubilee Gardens  
near the London  
Eye Ferris wheel



Researchers are struggling in fits and starts to understand the coronavirus. That's just how science always works. Unsettling as it may be to watch, it's the only way to defeat this pandemic.

ESSAY BY

## ROBIN MARANTZ HENIG

IF A THEME RUNS through the books and articles I've written over the past 40 years, it's a fascination with what scientists have learned about the human body. A long career spent explaining biomedical research has led me to a deep respect for the scientific process. Despite its occasional missteps and self-corrections, I believe it ultimately moves us toward a clearer understanding of the world and how to thrive in it.

So as scientists first scrambled to figure out the never-before-seen coronavirus, I was primed to follow their advice about how to keep safe, based on the hypothesis that the virus was transmitted mostly by droplets from coughs and sneezes lingering on surfaces. I dutifully wiped down countertops, refrained from touching my face, and washed my hands so emphatically that the little diamond in my wedding ring shone like never before.

And then, about two and a half weeks after my city, New York, shut down restaurants, Broadway plays, and the largest public school system in the country, scientists switched to a different message—that everyone should wear a mask. This was a startling about-face. The initial advice, confidently delivered, had been not to wear a mask, unless you were a frontline health-care worker. The revision was largely based on a new hypothesis, that the coronavirus spread mostly through the air.

Which was it, then? Surface transmission or aerosols? Should we be more afraid of contaminated elevator buttons or people breathing near us? Did scientists even know?

---

### How these images were made:

The photographer chose to capture our new routines with a thermal imaging camera to reflect how body temperature became an indicator of whether we might have the coronavirus. Temperatures are converted into a gradient of colors, ranging from cool blues to warm oranges.



The shift in advice about masks spooked me, I must admit. Not because of the new advice itself—I was more than happy to wear a mask if the experts said I should—but because of the ominous meta message I sensed beneath it: Scientists were figuring this thing out on the fly. The most earnest pronouncements from the world’s smartest experts suddenly sounded like little more than well-meant educated guesses.

As this devastating year draws to its raggedy close, it’s worth taking a moment to wonder what the long-term effect will be of watching scientists bob and weave on their way to a better understanding of the coronavirus and how to thwart the disease it causes, COVID-19—all out in public and all at breakneck speed. Even for a science geek like me, it has been unsettling to watch them debate, disagree, pivot, and reassess. I’ve been wishing instead that some lab-coated hero would just swoop in and make it go away. I was a baby in 1955 when Jonas Salk introduced his polio vaccine and vanquished a dread disease; ever after, my mother spoke his name with reverence. (1)

As scientists hustle to deliver us from a terrifying, seemingly intractable plague, there could be another happy ending—one that involves not just survival but also wisdom. If we learn any big takeaway from this doleful experience, I hope it’s not that our fellow human beings are myopic fools but that the scientific process can be trusted to get us through an existential crisis.

● **MAKE NO MISTAKE:** The challenge is huge and unprecedented. If a typical virus is a riddle wrapped in a mystery inside an enigma, the coronavirus known as SARS-CoV-2 is all that and more. It combines contagiousness and lethality in a ferocious mixture that Anthony Fauci, director of the U.S.

1. The polio virus could paralyze children and caused panic every summer, leading to the closing of camps and pools.

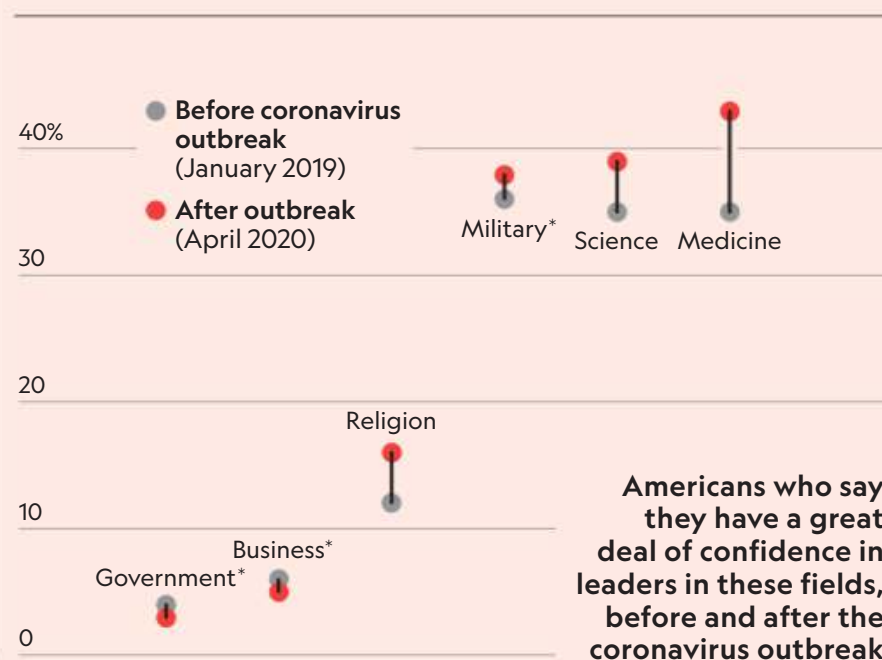
2. The over-reactive immune response, called a cytokine storm, is also seen with herpes, Ebola, and other viruses, as well as cancer and autoimmune diseases.

National Institute of Allergy and Infectious Diseases, has called his “worst nightmare.” For one thing, when it appeared, no one on Earth had immunity. Second, it’s airborne and infects the upper respiratory tract, which means it’s readily spewed back into the air where it can drift from person to person. Third, and arguably worst, the virus is most contagious before it causes symptoms, meaning that carriers feel well enough to be up and about precisely when they’re most likely to infect us.

The tricks this virus uses to foil the body’s counterattack are diabolically effective. Once it gets inside via the nose or mouth, the coronavirus eludes the first line of immune defense, slides easily into cells, churns out copies of itself by hijacking the cell’s machinery, and makes sure those copies work by using a proofreading mechanism that many other viruses don’t even have. Its effect is relentless: It can turn a person’s lung cells into useless material that looks like ground glass; blow open blood vessels or destroy them with microscopic clots; and gunk up the workings of a kidney, heart, or liver, rendering them too stiff to repair. It can defang the cells that attack invading viruses and then provoke a secondary immune reaction that goes badly haywire, paradoxically causing its own catastrophe. (2) And anyone who comes in close contact with a person already infected is likely—though no one is sure how likely—to get infected too.

Fauci’s worst nightmare? I could barely get to sleep.

As this pandemic threatens the entire world, the fight against it has been a very public one. The average citizen is getting insight into scientific



\*STATISTICALLY INSIGNIFICANT CHANGE

DIANA MARQUES, NGM STAFF. SOURCE: CARY FUNK, PEW RESEARCH CENTER

theorizing that is normally confined to academic conferences and slow-moving journals. Much of the debate over these ideas is taking place on television, as well as on Twitter, on Facebook, and in the backyard gatherings of lawn chair epidemiologists. I find myself wondering if anyone engaged in this chatter understands how science actually works.

One way it doesn't work is through the lone Jonas Salk-like hero that captivated me as a child. Science is a collaboration, with many heroes. We're seeing that now, as thousands of researchers have reoriented their labs, no matter how far afield from virology or infectious disease, to attack this hydra-headed problem collectively. There has never been anything like it, with scientists collaborating across borders at full throttle—even as some of their political leaders snipe at one another.

Watching this ramped-up scientific effort has felt double-edged: encouraging to see but so hard to follow that it also added to my free-floating anxiety. So I did what I've done my whole adult life—called up some scientists to see what they think. This is a wonderful benefit to being a journalist, being allowed to ask dumb questions of smart people. Usually it helps me clarify my own thinking. This time ... not so much.

Science on the frontier always exposes how little is known, even by the putative experts, so these phone calls made it clear to me how far we have to go. Still, it was nice to hear that a lot of scientists were looking for answers.

"It's been amazing to see how people are using their talents and gifts to address this," Gregg Gonsalves, co-director of the Global Health Justice Partnership at Yale University, told me. "People all want to do something," even if their training is in law, geography, anthropology, fine arts, or similarly far-flung fields.

All that research focus has led to a remarkable amount of information in a remarkably short time. Within weeks of the first known animal-to-human transmission, scientists had sequenced the virus's full genome. By summertime, more than 270 potential COVID-19 drugs were in active clinical trials in the United States.

As for the quest for the holy grail, a vaccine, an international phalanx of researchers from the U.S., China, Great Britain, India, Germany, Spain, Canada, Thailand, and elsewhere had identified more than 165 candidates by early August. Progress was so rapid that even a hyper-realist like Fauci—who tends to emphasize how important it is to conduct large-scale clinical trials before introducing new drugs—has said he is "cautiously optimistic" that a vaccine could be available early next year. If he's right—oh please, oh please, let him be right—

RETHINKING  
OUR HEALTH  
**TECH LEADS  
THE WAY**



Broadband access has never been equal. The pandemic exposed that divide. Yet advances in high-speed 5G telecom networks will fuel a growth spurt in fields from telemedicine to banking, education, and transportation, offering faster connectivity and greater access. "This will be a tidal wave of change," says David Grain, former president of a communications tower company then called Global Signal. More efficient networks will reduce costs and help small businesses leveled by the pandemic reach new customers and grow. —DANIEL STONE

3. The record was set in 1967 with the mumps vaccine. Scientist Maurice Hilleman used virus he had isolated from his daughter.

that would be three years faster than the fastest vaccine development in history. (3)

Sometimes science simply cannot be rushed, though. "There is some sort of serendipity to the scientific enterprise," Gonsalves told me. "The speed and scale of what is happening now could be just a prelude to the chance discoveries we're going to have to make over a longer period." Bottom line: "You can't scream a cure out of a test tube."

● **NEXT I CALLED** Howard Markel, director of the Center for the History of Medicine at the University of Michigan,

to talk about another source of my anxiety: that the coronavirus seemed to shape-shift in a uniquely terrifying way. It felt like every day I opened the newspaper to read that a new organ system was subject to its ravages or a new age group was vulnerable. But Markel, who has made a career studying the history of epidemics, told me that was to be expected: The apparent explosion of new and varied symptoms happens with any highly contagious virus when it bursts on the scene.

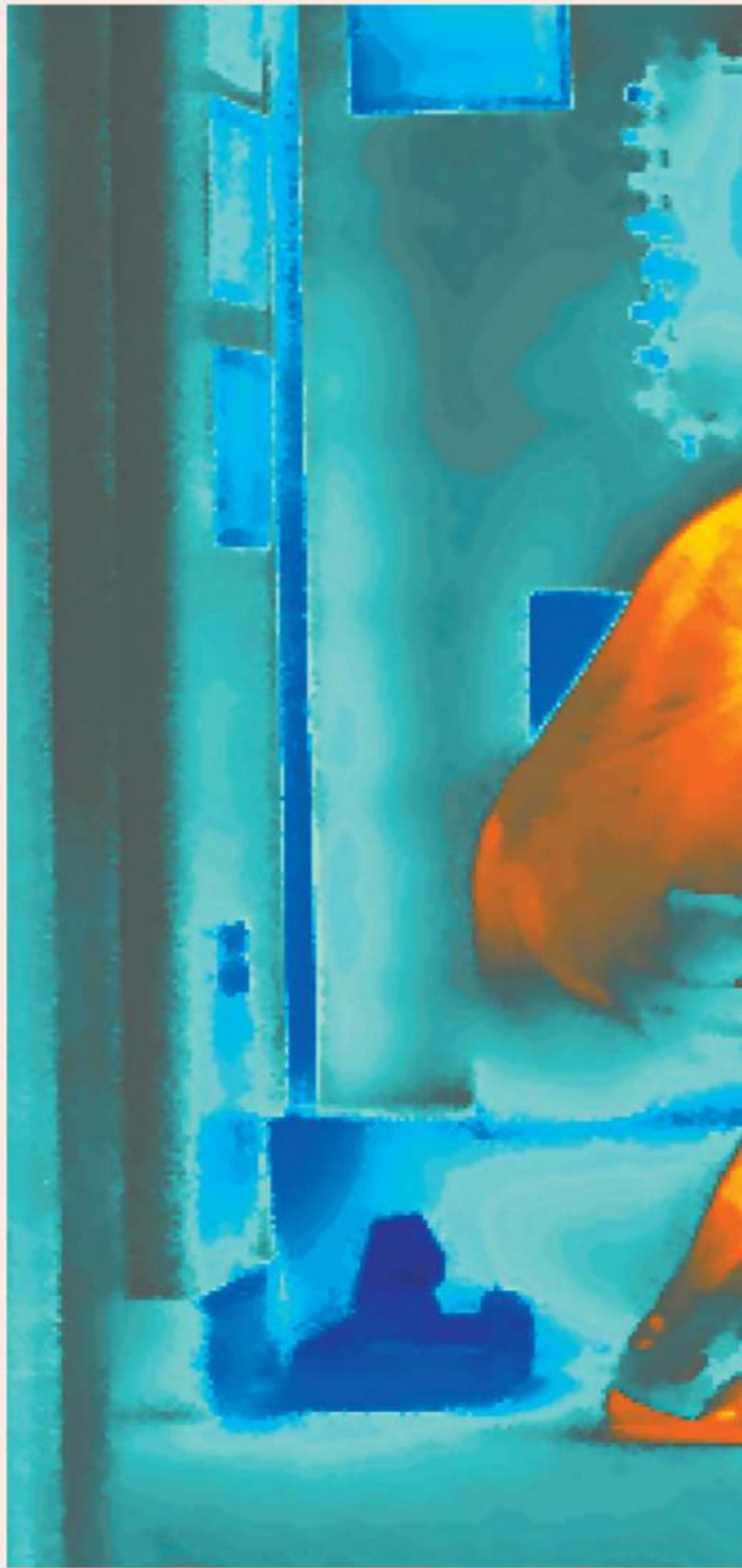
“The more clinical material you have, the more patients, the more chances you have to see this protean nature,” he said. It’s what happened in the early days of the AIDS pandemic in the 1980s, when Markel was just starting his career. At the dawn of any new disease, strange manifestations keep showing up and surprising doctors. Even if the odds of a rare symptom are, say, just one in a thousand, doctors are going to see a lot of it, Markel said, because a thousand patients can accumulate practically overnight with a crazily contagious new illness like this one.

So the U-turns and revised pronouncements about COVID-19 aren’t signs that scientists are flummoxed; they’re signs that scientists are generating a torrent of new information and are trying to make sense of it as they go.

Last I called an old friend, Stephen Morse, a professor of epidemiology at the Columbia University Mailman School of Public Health. Morse was the subject of a book I wrote nearly 30 years ago about emerging viruses, in which he basically predicted our current catastrophe. (4) Today he feels a bit put off by the frenzy.

“This is not the way I would like to see science being done—it’s happening so quickly,” Morse told me. He strained to look for a bright side. “A lot of knowledge is becoming available,” he ventured. And if

4. In 1989 Stephen Morse spearheaded the nation's first conference on emerging viruses, hoping to give scientists the tools to anticipate the next viral plague.



THERE HAS NEVER BEEN ANYTHING LIKE IT, WITH SCIENTISTS COLLABORATING ACROSS BORDERS AT FULL THROTTLE—EVEN AS POLITICAL LEADERS SNIPE AT ONE ANOTHER.



A temperature check  
at L'École de Battersea  
in South London



some of that supposed knowledge ends up being wrong, he said, seeming to strain even harder, couldn't that be construed as a good thing? "Science is a self-corrective process. Maybe even the effort to correct the errors will lead to improved knowledge." Maybe. But I didn't feel better when we hung up.

Still troubling me were a couple of things. First, the politicization of the process could upend everything. Even if science closes in on a more accurate view of COVID-19 and how to treat and eventually prevent it, that might not be how the story is

spun. Enough conflicting interests and alliances exist for the truth to be turned on its head without too much effort, making it seem as if scientists who amended their views based on new evidence were pretty much wrong from the start. (5)

Second, the science itself might suffer. If researchers take shortcuts for the sake of expediency or jump too far ahead of their data to offer advice, they might unwittingly tarnish the very process they depend on. Indeed, not long after I spoke to Morse, I read a report from a team of epidemiologists and biostatisticians from the Johns Hopkins Bloomberg School of Public Health that suggested a lot of the early research was too perfunctory to be of much use.

The scholars analyzed the first 201 COVID-19 clinical trials, which had been conducted in China, the U.S., and other countries. It seemed there had been a lot of corner cutting. One-third of the trials had no clear definition of treatment success; nearly one-half were so small (100 or fewer patients) they weren't really informative; and two-thirds lacked the gold standard safeguard known as "blinding," which keeps investigators from knowing which subjects are getting the treatment under study.

These less-than-ideal clinical trials were reported anyway, partly because leading scientific journals, such as the *New England Journal of Medicine* and those published by PLOS, had pledged to accelerate the peer review process, rushing coronavirus articles into print in half the usual time. Another avenue of publication involves preprint servers, which post articles online before they're peer-reviewed. These servers, created to promote transparency in scientific research, predate the pandemic, but they exploded in popularity as coronavirus studies were churned out. Journalists, their

5. The bizarre campaign to undermine Anthony Fauci claimed his early advice was overly optimistic, leaving out his constant qualifier: "This could change."

6. Peer review helps, but it's not a guarantee; of the first 25 retractions of coronavirus papers, 14 were in peer-reviewed journals.

readers ravenous for any updates, wrote articles about studies on these preprint servers no matter how small, no matter how tentative. (6)

As new findings, even weak or conditional ones, are publicized that contradict earlier findings, those of us trying to follow along can end up frustrated and confused. But while frustration and confusion among the science-minded might be unfortunate, it's not deadly. What really worries me is that those skeptical of science might see the apparent flip-flops as reason to turn against evidence-based advice altogether.

- **THE ANTI-SCIENCE** sentiment is out there, in the U.S. and elsewhere, and it's pernicious, having led to doubt about expert consensus on climate change, gun control, vaccine safety, and other hot-button issues. We're also seeing the emergence of COVID truthers, who insist the pandemic is either a conspiracy or a hoax. (Or maybe both? It's hard to keep track.) They venomously slam public health officials, some of whom have quit after one too many death threats. It has been astonishing to watch videos of people screaming at store owners or city council members for requiring them to wear masks.

This is not just an American phenomenon. With coronavirus misinformation, disinformation, and conspiracy theories circulating around the globe, the World Health Organization has declared that we are facing two public health outbreaks at once: the pandemic itself and an "infodemic" of dangerously misguided ideas about it.

But you don't need to be an unhinged COVID truther to be resistant to learning whatever lessons this pandemic can teach us; you just need to be an ordinary, shortsighted, fallible human.

"Every epidemic I've ever studied always ends with global amnesia," Markel said. "We go back to our merry lives." The "glaring problems" that contributed to the outbreak—urbanization, habitat destruction, international travel, climate change, war refugees—simply persist, he said,

MAYBE THE PANDEMIC WILL  
PERSUADE EVEN THE SKEPTICS HOW  
CRUCIAL SCIENTIFIC DISCOVERY IS  
TO HUMAN FLOURISHING.

as people lose interest in demanding that more time, money, and brainpower be devoted to science. “Politicians move on to the next show, while policymakers cry out in the wilderness, ‘We still need this!’”

Already the 21st century has been what Markel calls the century of epidemics: SARS in 2003, H1N1 influenza (swine flu) in 2009, MERS in 2012, Ebola in 2014 to 2016, and now COVID-19 in 2019, 2020, and who knows how many years beyond. Five epidemics in 20 years, each one a little worse than the one before—and this one many times worse than the other four put together.

● **MAYBE, IN A WEIRD WAY,** watching scientists try to build a plane while they’re flying it—as some have described coronavirus research—will be good for our overall understanding of the scientific process. Maybe the pandemic will persuade even the skeptics how crucial scientific discovery is to human flourishing.

That’s the hope of Lin Andrews, director of teacher support at the National Center for Science Education. “People innately trust scientists overall, but when it’s a polarized topic, things can go wonky,” said Andrews, a former high school biology teacher. She and 10 colleagues, seeing the pandemic as a teachable moment, have devised a five-part lesson plan, good for classroom or home use depending on whether particular school districts are open. It focuses on epidemiology as a way to educate high school students—and, by extension, their parents—about what the scientific process entails.

The course shows how scientists construct their theories, Andrews said, by emphasizing “all these stumbles that were made along the way.” It includes milestones in epidemiology, such as when British scientist John Snow traced the London cholera outbreak of 1854 to contaminated drinking water. No one believed Snow—the prevailing theory was that cholera was spread through the air in a contagious “miasma”—until he had the handle removed from the water pump on Broad Street, shutting

7. Until 19th-century scientists proved that microbes transmit disease, epidemics were blamed on such causes as viscous blood and “putrid effluvium.”

off the contaminated water supply and stopping the outbreak. (7)

Snow’s realization came years before the confirmation of germ theory, which explains the existence of pathogens. He didn’t understand how cholera was transmitted in the water, simply that patterns of disease indicated it was. Learning about the step-by-step progression of historical discoveries will, Andrews hopes, put in context the fits and starts of contemporary scientists’ attempts to understand COVID-19.

Maybe our unfiltered view will

## RETHINKING OUR HEALTH

### REMOTE POSSIBILITIES



The internet has made it possible for millions of people to work remotely, but it’s put us at risk from cyberattacks. Jesper Andersen, CEO of cybersecurity firm Infoblox, says that “it’s a lot more complex to secure an all-remote business,” let alone a telehealth office or a network for self-driving cars. Today’s VPNs (virtual private networks) won’t function efficiently with millions working from home long term. Decentralized servers will increase speeds, and more elaborate ways to log in will strengthen online security. —DS

turn out to be a good thing. After all, the best way to build trust in science is by showing all of its hypothesis testing and hypothesis tweaking—maddening to watch while we’re anxiously awaiting answers to a global plague, but in the end the only way toward results that will allow us to move on with our lives.

Surveys show the general public is less dismayed by watching scientists in action than I had feared. Since 2015, the Pew Research Center has tracked what Americans think about science, and it has steadily become more positive, including in a poll conducted in

April and May 2020 as the coronavirus was cresting and many of those surveyed were under lockdown.

In January 2019, the last survey before the pandemic, respondents were already inclined to trust scientists, with 86 percent saying they had a “great deal” or a “fair amount” of confidence that scientists had the public interest at heart. That level of trust inched up to 87 percent amid the pandemic.

But when I called Cary Funk, the director of science and society research at Pew, to talk about these encouraging results, she told me not to get ahead of myself, that the story is a bit more complicated. According to Funk, the surveys show a deep partisan divide in how much scientists are trusted. Republicans and Republican-leaning independents still seem reluctant to embrace science wholeheartedly.

**8.** Shortly after July's coronavirus surge in the U.S., Pew found that just 46% of Republicans thought COVID-19 was a “major” public health threat, compared with 85% of Democrats.

They are about half as likely as Democrats to express a “great deal” of trust in scientists—a proportion that has stayed stubbornly low at 27 percent. **(8)**

Pew's surveys also reflect a deep racial divide in attitudes toward science. Black adults, according to the poll conducted earlier this year, are less likely than the general population to trust medical scientists. They are also less likely to have confidence in new COVID-19 treatments or vaccines; just 54 percent of Black respondents would “definitely” or “probably” get a COVID-19 vaccine, compared with 74 percent of whites and Hispanics. This distrust, exacerbated by the substandard care many Black patients get in doctor's offices and emergency rooms, is especially troubling in the context of COVID-19, which kills Blacks at more than twice the rate at which it kills whites.

The racial and political divides in how science is viewed are especially insidious now, when skeptics could undermine whatever progress scientists make in the coronavirus fight. In the worst-case scenario, if enough doubters ignore



Injecting a refrigerated COVID-19 trial vaccine developed at the University of Oxford

control measures and vaccines, that could strip science of its ability to protect us altogether.

● **I'D LIKE TO BELIEVE** Andrews is right about this being a teachable moment—maybe not so much for those of us already fixed in our views, but for those whose childhood is being shaped by the coronavirus. These children—whom some are calling Generation C—might grow up with less patience for the polarization fogging our responses today. Let's say they spend their formative years watching the scientific process up close. And let's say that in the end, scientists actually do save the day.

Now it's the year 2040, and Gen C is all grown up. Suddenly a new pandemic emerges. Based on what they learned by living through COVID-19 at an impressionable age, these young adults recognize the urgency of the new outbreak, quickly dismissing any claims that it's a hoax. They put on masks, maintain social distance, get vaccinated as soon as a vaccine is developed (and it's developed quickly, because scientists have also learned a thing or two in the interim, as have politicians). They follow experts' recommendations because they know it's the best way to protect not only themselves but also their neighbors from a plague similar to the one they grew up with that killed hundreds of thousands of people around the world.

Gen C gets through the new pandemic with relatively few deaths or economic disruptions because they learned some crucial lessons when they were children: that public health advice is based on the best available data, that such advice can change as new evidence accumulates, that science is an iterative process that cannot be fast-tracked.

Maybe by then there also will be more workers in the professions that got us through the coronavirus catastrophe: more doctors, nurses, paramedics; more specialists in infectious disease, epidemiology, virology, and microbiology, each of them having chosen a career that as kids they had watched in its finest hour. It has happened before. Some of the scientists now engaged in the struggle against the coronavirus, such as Gonsalves and Markel, ended up where they did after working to help untangle AIDS, an earlier viral mystery that killed us in ways never seen before.

So the question is whether Gen C will respond with something other than “global amnesia”

when the next plague arrives, as it almost surely will. This is what I yearn for, not just for the sake of my own bruised confidence but also for the sake of my two beloved granddaughters, who would have to live the reality I'm most fretting about.

Much depends on what happens in the coming months.

Imagine, for the sake of argument, that the epidemiological curves I've obsessed over all year ultimately play out in our favor, and we can return to some semblance of normal. Imagine that effective treatments are found that make COVID-19 short-term and curable for just about anyone. Imagine that a vaccine is developed soon and that a significant portion of the world population gets it. If all that happens, why wouldn't we emerge from this with a greater appreciation of the scientific enterprise in all its messy brilliance?

I try to hold on to that hope, despite the catcalls of politicians and “personal choice” zealots who second-guess everything the scientists do. I try to tell myself that sometimes our better angels prevail. And that there's an army's worth of better angels—scientists, educators, doctors, nurses, public health advocates—who, since that eerie image of the spiky coronavirus started haunting our collective dreams, have been working tirelessly toward a happy ending.

That's the ending I'm trying to believe in, where we emerge from this with a renewed appreciation of science as humanity's best chance of salvation from suffering and untimely death. □

---

**Robin Marantz Henig** is a frequent contributor. In the July issue, she wrote that the experts warned a pandemic was coming. **Giles Price**, based in London, explores the social landscape in his photography, often with different imaging technology.

In this East Jakarta public cemetery, land was cleared solely for COVID-19 victims. Crosses mark the Christian plots; Muslim graves are grouped together beneath pillar-like markers. Indonesia is home to 13 percent of the world's Muslims.



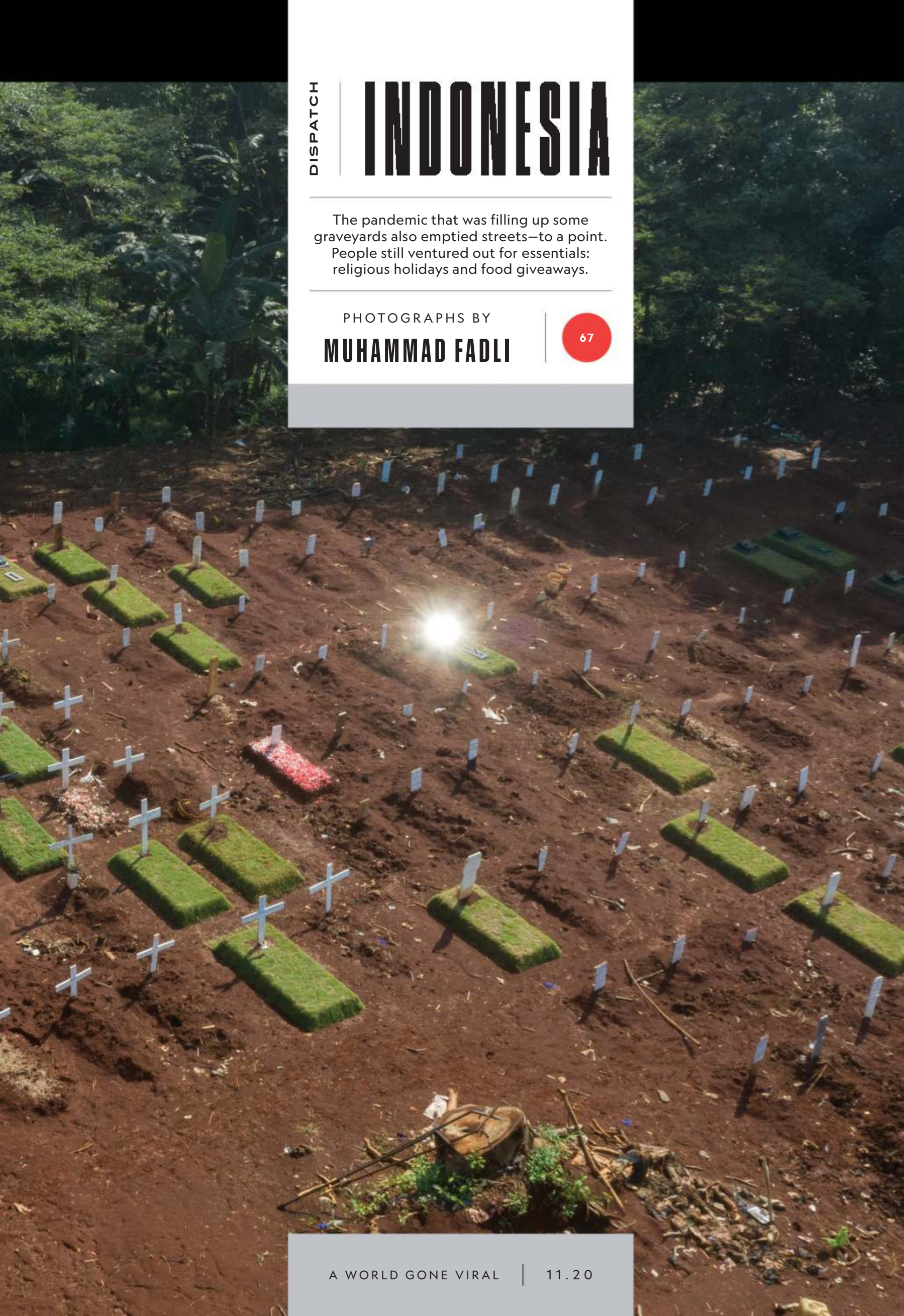
DISPATCH

# INDONESIA

The pandemic that was filling up some graveyards also emptied streets—to a point. People still ventured out for essentials: religious holidays and food giveaways.

PHOTOGRAPHS BY  
**MUHAMMAD FADLI**

67









Distancing protocols vanish as word goes out one day: free food and mask distribution at a Jakarta military installation. At 273.5 million, Indonesia's population is the fourth largest in the world. Its economy, which was growing fast before the pandemic, depends heavily on the informal sector—self-employed people with few fallback resources to pay for food and shelter.

BY CYNTHIA GORNEY

**T**HE PANDEMIC CRIPPLED the *mudik*, which is what Indonesians call the great holiday migration of city people traveling to see their families in villages and the countryside. Indonesia’s Muslim population is the world’s largest, and the Ramadan *mudik* is massive. In an ordinary year, as the month of daily fasting comes to a celebratory close, photographer Muhammad Fadli would buckle his wife and daughter into the family’s Nissan van and brave the traffic out of the capital, Jakarta. The trip to Fadli’s hometown takes 36 hours by winding roads and ferry, but his parents are there. Fadli is their only child.

Late this past April, with infection numbers soaring and Ramadan about to begin, the Indonesian government restricted region-to-region travel for six weeks: a “*mudik ban*,” the *Jakarta Post* called it. Stuck in the city, Fadli kept working. A photographic assistant drove him through streets that were empty and still, until the morning they rounded a corner and saw a throng—stopped cars, motorbikes, women and men on foot packed shoulder to shoulder, all shoving urgently toward something.

“Pull over,” Fadli said. He pushed up his face mask and hurried out. What is happening? he asked, and without glancing at him, people said, “*Bantuan sosial*.” Social aid. Rice, masks, and fermented soy cakes, all being handed out by uniformed men on the other side of a closed gate.

The military men kept shouting, “*Tolong sosial distancingnya*,” please stay apart; we won’t give anything until you stay apart! Useless. Need and anxiety are propulsive forces, especially in a crowd. As the men gave up and swung open the gate, Fadli felt the weight and blessing of his own family’s modest comforts. They had enough to eat. He had work. Indonesians were defying the travel ban already, spreading virus the length and breadth of the archipelago, but he knew the home of his parents was empty of guests: somber, quiet, safe.

Fadli’s Ramadan visit would take place by cell phone video chat, and he could picture it even now: his mother’s festive clothing stored away, her hair uncovered with no need for hijab among close family, his father beside her on the couch. They’d greet each other in the Indonesian Ramadan way: “I sincerely request that you forgive my past wrongdoings.” Then they’d settle in to talk. □



## OUTBREAK RESPONSE

Indonesia’s COVID-19 outbreak dates from March 2, when its first two confirmed cases were reported. On day 54 of the outbreak, a new policy temporarily banned domestic road, sea, and air travel. The toll by day 100: 1,883 deaths.



\*SEVEN-DAY AVERAGE

TAYLOR MAGGIACOMO AND IRENE BERMAN-VAPORIS, NGM STAFF

SOURCES: OXFORD COVID-19 GOVERNMENT RESPONSE TRACKER; EUROPEAN CENTRE FOR DISEASE PREVENTION AND CONTROL

---

**BELOW:** A sign points cars and motorbikes to an improvised drive-through: two nurses, waiting to draw blood on the spot for COVID-19 antibody tests. Like the U.S., Indonesia

offered sparse, sometimes bungled testing during early pandemic weeks. **BOTTOM:** In rural areas poorly served by the government, some residents set up their own

quarantine precautions. A Purwodadi villager felled bamboo poles to make this barrier. His multilingual sign states an exception: Farmers heading to rice fields may pass.





Portrait artist Sigit Parwanto, carrying samples, counted on orders from tourists at Java's popular Parangtritis Beach—until last spring, when the visitors vanished.

**BELOW, LEFT:** These Batik Air pilots' flight assignments declined once the pandemic reached Indonesia.

**BELOW, RIGHT:** Surakso Widarso still performs his caretaking duties at

a Javan pilgrimage site, though it's deserted.

**BOTTOM, RIGHT:** Friends since their childhood on the island of Sumatra, these young Indonesians were forging big-city lives in Jakarta until

COVID-19 closed their workplaces; now a ferry carries them home.

**BOTTOM, LEFT:** Jakarta nurses staff an antibody test site where drivers get blood drawn while remaining in their cars.





One day into a temporary halt on commercial flights and sea travel, nothing stirs at Indonesia's Yogyakarta International Airport—a new facility in Central Java built to handle



an eventual 20 million travelers a year. The government's stringent travel restrictions were announced in April, less than a month after the airport formally opened.

# Let's Not Waste This Moment



Nature, enduring:  
Bristlecone  
pines in eastern  
California can  
live 4,000 years  
or more.



The pandemic has reminded us of the urgent need to stop abusing the planet. It could inspire us to prevent the looming climate disaster—if we can resist a return to business as usual.

ESSAY BY

## ROBERT KUNZIG

**IN THE SPRING OF 1858**, three years before the Civil War, a young engineer named John T. Milner rode into Jones Valley, at the tail end of the Appalachians in north-central Alabama. He'd been dispatched by the governor to plan a new railroad. There were riches in those hills: The state geologist had reported coalfields to the north of Jones Valley and, just to the south, cropping out at the crest of Red Mountain, a thick seam of iron ore.

Milner rode up through ancient woods to see it. "I rode along the top of Red Mountain and looked over that beautiful valley," he recalled much later, after he'd helped fill the valley with Birmingham, a city of belching smokestacks, intersecting railroads, and dark, deadly mines:

"It was one vast garden as far as the eye could reach ... nowhere had I seen an agricultural people so perfectly provided for, and so completely happy. They raised everything they required to eat, and sold thousands of bushels of wheat. Their settlements were around these beautiful, clear running streams ... It was, on the whole, a quiet, easy-going, well-farmed, well-framed, and well-regulated civilization."

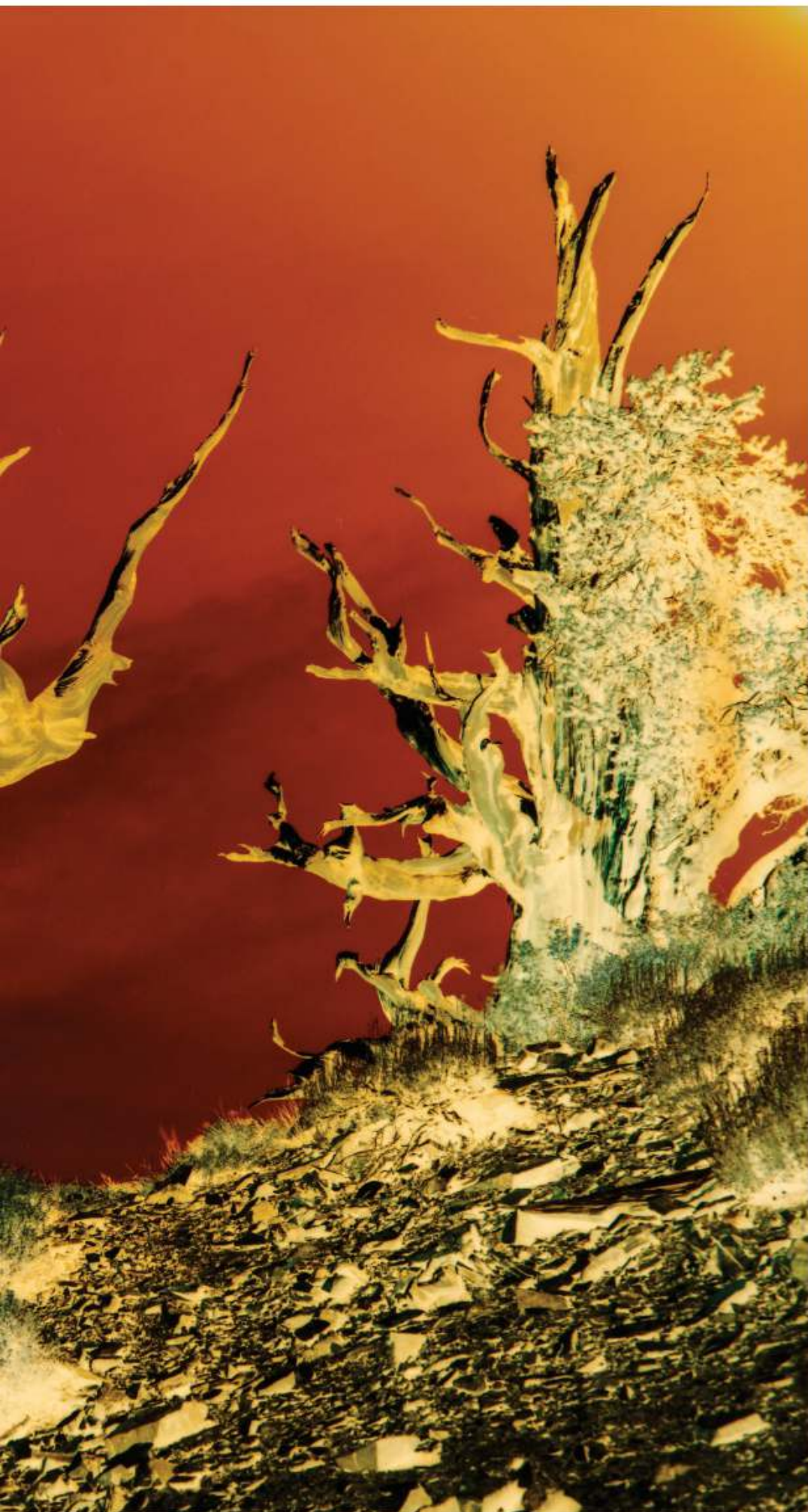
About a quarter of that well-regulated civilization were enslaved African Americans.

The city Milner and others envisioned was to be a kind of industrial plantation, built on enslaved labor. The Civil War intervened, but when Birmingham was finally established in the 1870s, its founders approximated that vision as closely as possible. With coal-and-iron riches to rival those of Britain, birthplace of

---

### How these images were made:

John Chiara built a large camera obscura, mounted it on a trailer, and drove it to various locations. It makes negative images directly on color negative paper.



the industrial revolution, but with the bonus of cheap Black labor—including legions of fraudulently arrested convicts—the Alabamians built a new economy and a “Magic City.” It was a city that generated great wealth for a few and a decent living for many more—poor white sharecroppers from the countryside and some Black ones and immigrants too. It was a city that churned out rails and girders to build a booming nation. But it was destined to become the most segregated city in the United States, as Martin Luther King, Jr., declared in 1963, and one of the most polluted.

Nowhere is the riven soul of industrial capitalism on starker display than in Birmingham, Alabama. Nowhere is it clearer how much visions of the future can matter.

Since March, when National Geographic shut down its offices in Washington D.C., I’ve been riding out the pandemic with my wife, a native Alabamian, in a house just a mile south of Red Mountain. From our front stoop we can see, on the crest of the ridge, the backside of Vulcan, the city’s giant but oddly dwarfish cast-iron mascot, thrusting his spear into the heavens. Every evening we get a gut punch from the national news—from images of food and unemployment lines and overflowing ICUs; from the stories of people who, unlike us so far, are suffering harshly. Every morning, like other fortunate people in this plague season, I go for a long walk in the neighborhood, listen to the emboldened birds, check on the vegetable garden. I’m not from this place, but I’ve grown attached to it. Somehow, I hope, paying better attention to it will help me make sense of the world.

My job at *National Geographic* magazine is to think about the global environment. When the pandemic hit, I was on a ship in Antarctica. Our April issue, devoted

to the 50th anniversary of Earth Day, was on its way to subscribers. What will Earth look like, it asked, on the 100th anniversary in 2070? Back in Washington for a few days, utterly disoriented by 2020, I picked up *The Plague*, the 1947 novel by Albert Camus. It was flying out of bookstores, the *Guardian* reported. The parallels were indeed a little eerie. “They went on doing business, they planned trips, they had opinions,” Camus wrote about the early days of denial in Oran, Algeria. “How would they have given a thought to anything like plague, which rules out any future...?”

But our future hasn’t been ruled out. It has just gotten more bewildering—and wide open.

What long-term effect, if any, will the COVID-19 pandemic have on the environment? What will it mean for the air in our cities and the plastic in our oceans, for the rainforest that dwindled further and the climate that kept heating this year—so hot already that large stretches of Siberian tundra burned? **(1)** Will the experience of COVID-19 change in some lasting way how we treat this planet, as nearly eight billion humans scramble to make a living on it?

“The first terrible revelation of this unprecedented crisis is that all the things that seemed separate are inseparable,” writes French sociologist Edgar Morin in a new book on the lessons of the pandemic. Shut in as never before, Morin believes, we’ve become more open than ever to reconsidering the path we’re on as a species. He brings exceptional experience to the matter: He’s 99, born in the shadow of the 1918 flu pandemic.

As I was reading his book in mid-June, the U.S. was in its fourth week of demonstrations after the killing of George Floyd. Confederate monuments had begun to fall across the South, including in Birmingham. **(2)** Calls for “systemic change” were everywhere. And suddenly, the idea that the system that needs changing stretches from the way we treat people of color to the way we treat the Earth, and from the federal government into each individual heart, seemed to make

**1.** Siberia’s heat wave “would have effectively been impossible without human-induced climate change,” scientists concluded in July.

**2.** In removing one obelisk, Birmingham mayor Randall Woodfin defied a 2017 Alabama law.

CLIMATE EXTREMES, THE PANDEMIC,  
AND POLICE VIOLENCE ALL LEAD US  
TO BECOME AWARE OF THE SAME FEELING:  
VULNERABILITY.

emotional sense. Climate extremes, the pandemic, and police violence all lead us to become aware of the same feeling: vulnerability. In 2020 it became a nearly universal experience.

That shared sense of vulnerability could open our hearts to the need to transform our world for the common good. It also could lead us to see other people merely as threats, and make us long to return to the pre-pandemic normal as soon as possible—with more walls and less air travel, perhaps, but much the same level of environmental destruction. However the future unfolds, it's not something to be predicted, like the passage of a comet. It's something we build. As I walked along Red Mountain this year and looked down into the valley, it was not hard to keep sight of that commonplace yet crucial truth.

● **EARLY ON, AMID** the pain and suffering, there were glimmers of a greener world. Economic shutdowns produced a real respite from air pollution, for example. The cleaner air was more than an aesthetic delight: In China, from mid-February to mid-March, it averted some 9,000 deaths or more, Yale University researchers calculated—roughly double the number caused in China by the coronavirus. But the reduction was only temporary. By July, China's economy had reopened, and air pollution was worse than the year before.

Worldwide, carbon emissions also declined sharply—by as much as 17 percent in early spring. But they too inevitably rebounded, and researchers estimated that the decline for all of 2020 would be no more than 8 percent, depending on the course of the pandemic. On one hand, that's a large drop: It shows that with a gun to our heads, we can stop driving and flying. On the other hand, the carbon dioxide level in the atmosphere continued to rise this year, just a little more slowly. To keep global warming since the 19th century below the internationally agreed upon target of two degrees Celsius, we'd have to cut emissions to near zero no later than 2070. That would require declines like 2020's every year for decades.

And what about the birds, widely reported this year to be exceptionally loud and happy? I

noticed them too as the traffic noise I'd been oblivious to briefly ebbed from our backyard, and I was eager to talk again with the ornithologist who'd inspired me to learn a few of their songs. Mario Cohn-Haft works at the National Institute of Amazonian Research in Manaus, Brazil, a city that has been hurt badly by the pandemic. He knows the Amazon well and the songs of more than a thousand birds by heart. He dismissed the talk of resurgent wildlife.

“What I've seen is a steady, gradual decline in abundance and species diversity in the 30 years I've

RETHINKING  
OUR WORLD  
**GET OUT AND  
STAY OUT**



U.S. national parks saw dramatic drops in visitors last spring—but then numbers rebounded, as did sales for RVs and bikes. The Leave No Trace Center for Outdoor Ethics says that recreationists reported going outdoors more often this year and also shifting from adventure sports requiring travel—skiing, climbing, backpacking—to closer-to-home activities such as bird-watching, gardening, and bike riding. Many cities closed streets to make room for outdoor dining, public events, and parks. —DANIEL STONE

3. In North America the total bird population has declined by 29 percent since 1970, a 2019 study found—a loss of nearly three billion birds.

been here,” he said, recalling how Manaus expanded from a sleepy river town to an industrial metropolis of two million people. (3) The pandemic wouldn't change that. On the contrary, he worried about a backlash against wild animals, starting with bats—the carriers of the novel coronavirus. “Humanity's relationship to nature is pretty ambivalent to begin with,” Cohn-Haft said. “This kind of event just fosters people's fear.” In the Amazon this year, deforestation has been far worse even than in 2019, when it surged dramatically.

The environmental problems we face have been building for decades.

If COVID-19 makes a lasting difference, it won't be because it briefly stopped traffic. It will be because the whole experience—including noticing birds and breathing cleaner air—changed our culture.

“Science clearly shows that this decade is the decisive decade for humanity’s future on Earth,” said Johan Rockström, director of the Potsdam Institute for Climate Impact Research, outside Berlin. His office is in the tower of a former astronomical observatory, and when we spoke on a Thursday in May, he was all but alone in the sprawling 19th-century building. Since 2009 Rockström and other researchers have argued that humanity is bumping up against, or in a few cases hurtling past, nine

distinct “planetary boundaries.” The biodiversity we’re losing as we cut down forests and extinguish species is one boundary; the nitrogen we’re funneling into waterways from overfertilized fields is another. Scientists debate the extent to which these boundaries can be quantified and whether beyond them lie “tipping points” of catastrophic change. But the basic idea that we’re doing dangerous harm to the planet is hard to dispute. Climate change is the prime example.

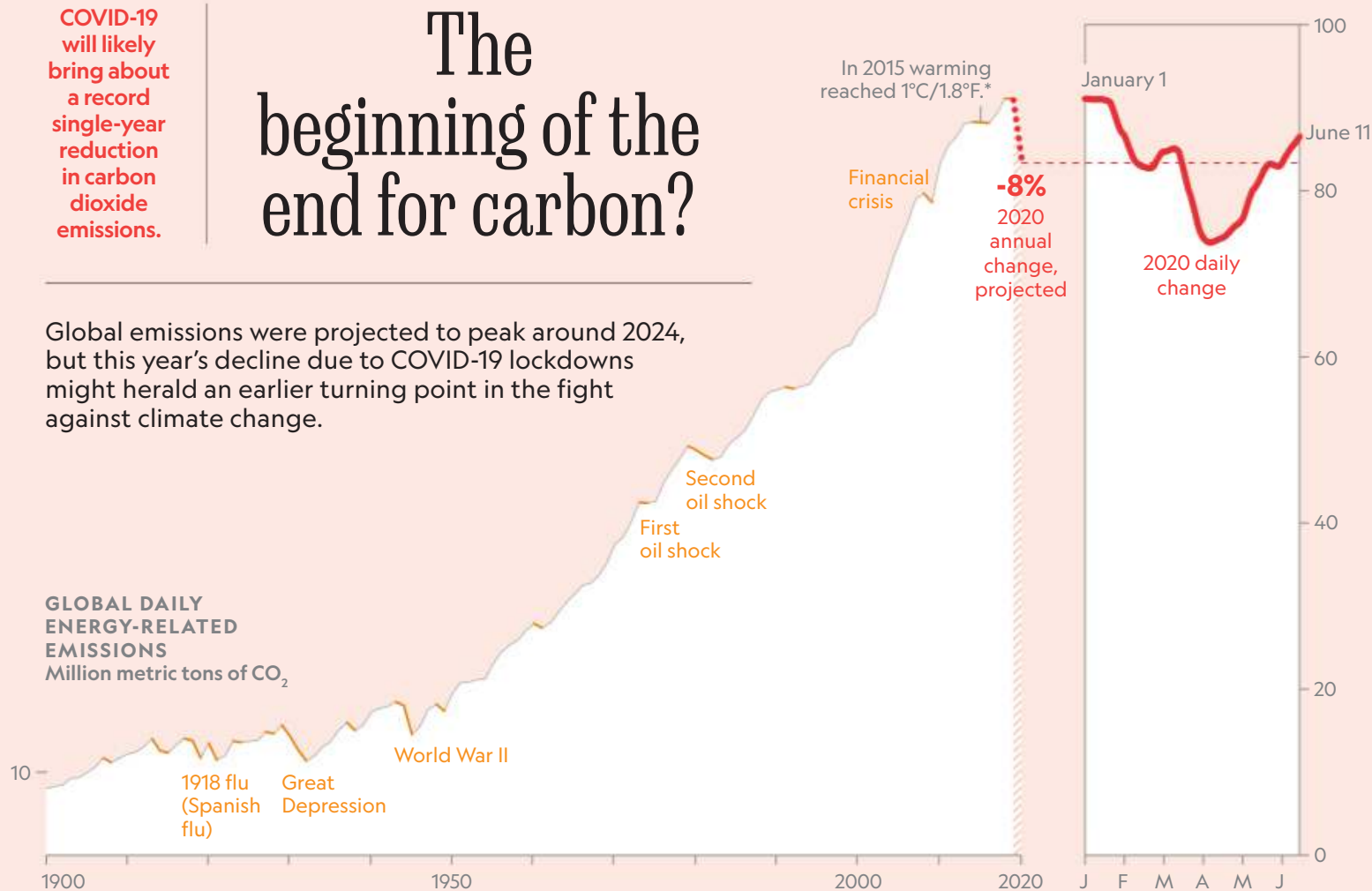
Why do we find it so hard to come to grips with this well-documented threat? Princeton University psychologist Elke Weber has spent decades researching that question. “The most fundamental problem is that we’re too myopic as a species,” she told me. “We’re focused on us. We’re focused on the here and now.”

In the Stone Age that was a good survival strategy, but now that we’ve spread across Earth, we face threats that aren’t here and now, like lions were then. Climate change is global, and to stop

COVID-19 will likely bring about a record single-year reduction in carbon dioxide emissions.

# The beginning of the end for carbon?

Global emissions were projected to peak around 2024, but this year’s decline due to COVID-19 lockdowns might herald an earlier turning point in the fight against climate change.



## HISTORICAL TRENDS

Recoveries from past crises caused swift rebounds in emissions, including the highest year-over-year increase on record after the 2008 financial crisis. Decarbonization of energy supplies would help break the link between economic growth and emissions.

## TODAY

Reflecting no structural changes, lockdown-driven declines are unstable and temporary.

\*ABOVE PREINDUSTRIAL LEVELS

NGM STAFF; LAWSON PARKER; SCOTT ELDER. SOURCES: INTERNATIONAL ENERGY AGENCY; PANDEMIC EMISSIONS: LE QUÉRÉ AND OTHERS, *NATURE CLIMATE CHANGE* 2020; CURRENT AND INTENDED TRAJECTORIES WARMING AND ESTIMATED EMISSIONS 2040-2100: ZEKE HAUSFATHER, THE BREAKTHROUGH INSTITUTE; CONCENTRATION: MET OFFICE HADLEY CENTRE

it we have to take actions whose benefits will only be felt far in the future. Yet with our limited attention, Weber said, we generally default toward choices that preserve the status quo.

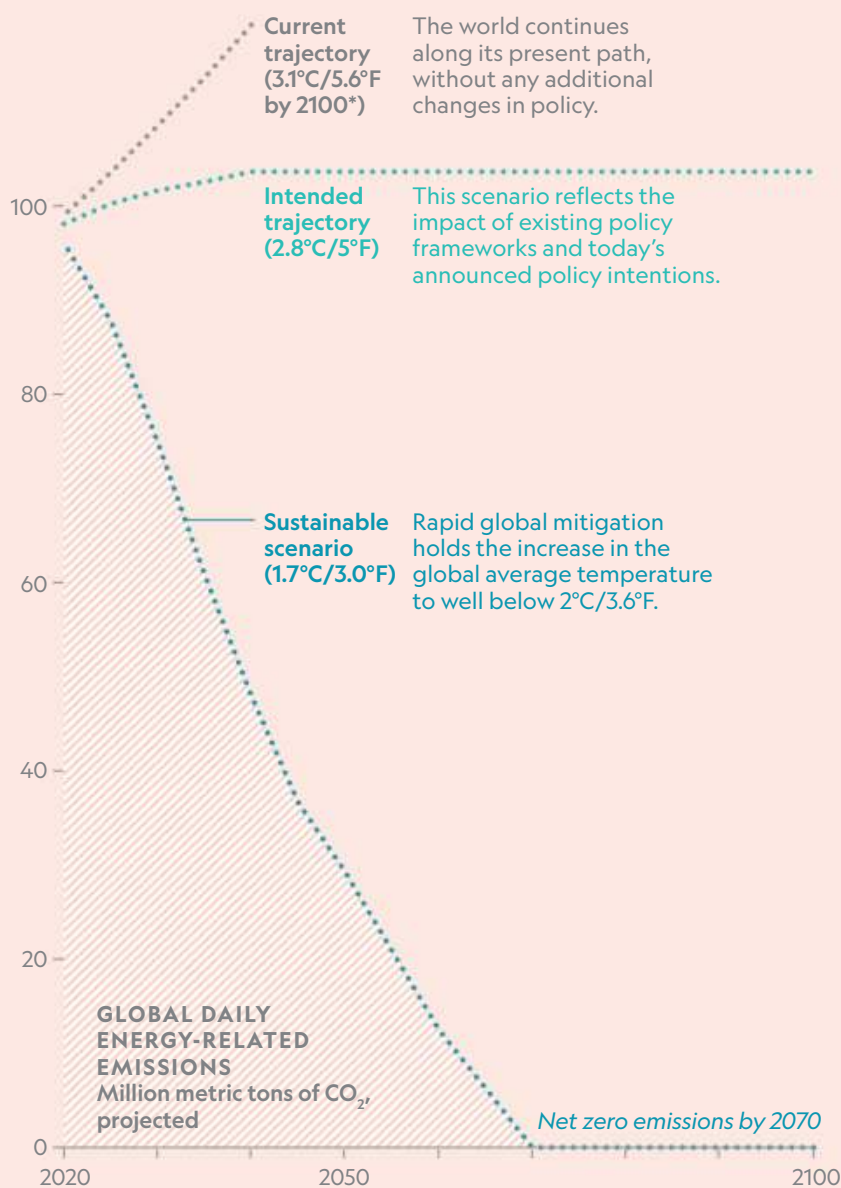
The scale and complexity of the climate problem also discourage thinking about it. But there are ways of making it seem more manageable. One morning on Zoom, the director of the MIT System Dynamics Group, John Sterman, walked me through a choose-your-own-future simulator he'd created with an outfit called Climate Interactive. At the bottom of the screen, 18 sliders allow the user to set policies that affect climate. Moving a slider triggers instant feedback: A large number in the top right corner indicates the resulting global temperature rise by 2100. The game is to keep the rise below two degrees Celsius. (4) Sterman assured me all this was based on the latest science.

Anyone with a dash of nerdiness and number-love might enjoy the simulator; I personally was

4. The simulator is free at [climateinteractive.org/tools/en-roads](https://climateinteractive.org/tools/en-roads). Surprisingly, population control doesn't help much.

transfixed. One of my own future worlds pushed energy efficiency to the max in cars and buildings, cut greenhouse gas leakage from pipelines and farms, taxed carbon moderately, and stopped new investment in coal and oil by 2025 and 2035, respectively. A couple more measures got me almost down to two degrees; sucking some CO<sub>2</sub> out of the atmosphere pushed me to the finish line. Because the technology to do that is unproven, Sterman himself preferred to slap a higher price on carbon.

Sterman has briefed Democrats and Republicans alike many times with the simulator. "What it allows people to do is create the future they want to see," he said. He never tells them ahead of time what to

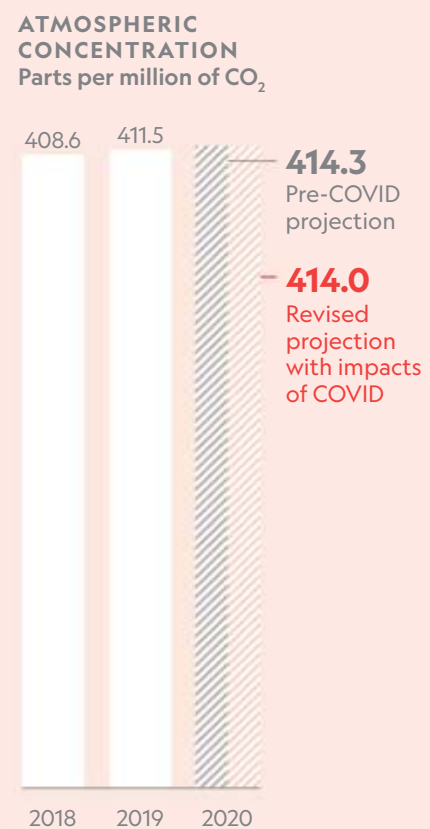


**FUTURE SCENARIOS**

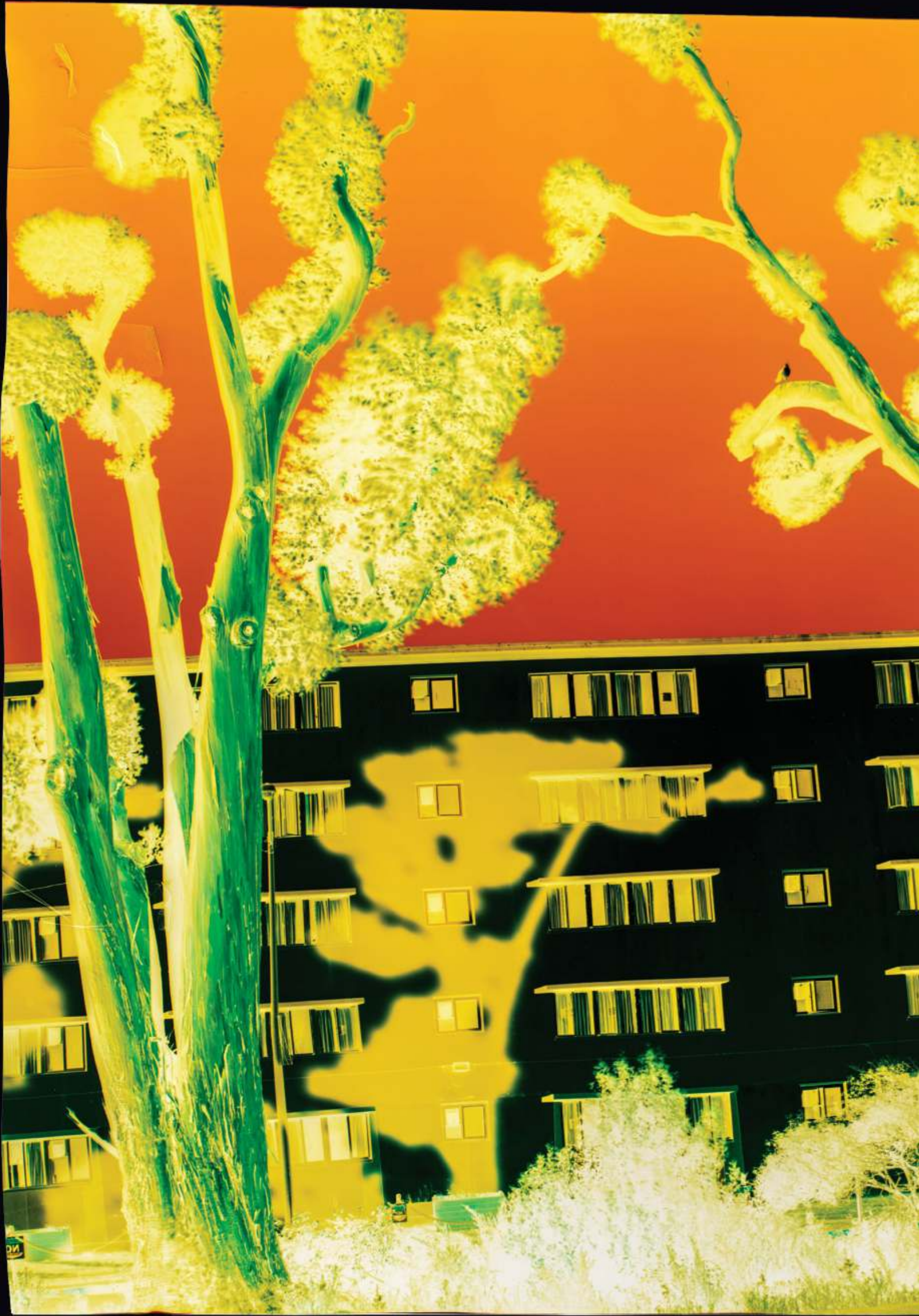
Keeping global warming to no more than 2°C/3.6°F above preindustrial levels is achievable but would require prompt, drastic emissions cuts, sustained year after year for decades, until net emissions are zero.

WARMING FROM THESE FUTURE SCENARIOS ARE ESTIMATIONS ONLY AND PRONE TO UNCERTAINTIES IN CLIMATE SENSITIVITY AND CARBON CYCLE FEEDBACKS. PROJECTIONS ADD EMISSIONS FROM INDUSTRIAL PROCESSES SUCH AS CEMENT CALCINATION.

The amount of CO<sub>2</sub> in the atmosphere, which drives warming, reflects our emissions over centuries. An 8 percent cut in 2020 will slow its rise only a bit.



The 2020 reductions can help stop atmospheric CO<sub>2</sub> and temperature from rising—but only if they're the start of a trend.





Nature and building, coexisting: on artificial Treasure Island in San Francisco Bay.

5. Reminding people of their country's long history also encourages them to think long term about the future and the environment, Elke Weber has found.

choose; discovering a path yourself is far more convincing—and activating. “They come away with the sense that solving the problem is important,” Sterman said. “But even more, that it’s possible.”

In her behavioral psychology experiments, Weber has found several other ways to encourage people to focus more on the future. One is particularly relevant now. In that experiment, members of one group were questioned on their beliefs about climate change and their willingness to make pro-environmental choices. Those in the second group got the same questions—but first they spent a few minutes writing a short essay on how they’d like to be remembered by future generations.

“We all hate the fact that we’re going to die,” Weber explained. “Every once in a while we get reminded that we’re mortal.” In her experiment, at least, the reminder made people more concerned about the environment and more willing to help. (5)

● **THINKING AHEAD** to the Earth we’ll leave our children, and to the story they’ll tell about us, can be bracing. So is looking back at the story we tell ourselves, consciously or not, and where that story comes from. The narrative that underpins European and American civilization has had a big effect on the planet over the past few centuries. The Bible is a good starting point.

In Genesis 1, according to the King James Version, humans are called on to “have dominion over... every living thing that moveth upon the Earth.” Ellen Davis, a theologian at Duke University who has written a book on the agrarian roots of the Bible, has reflected at length on that passage. “When we hear ‘dominion,’ we think ‘domination’—a heavy-handed, top-down imposition of human power on the rest

Individual actions are not enough to curtail warming.

# Solving the crisis sustainably

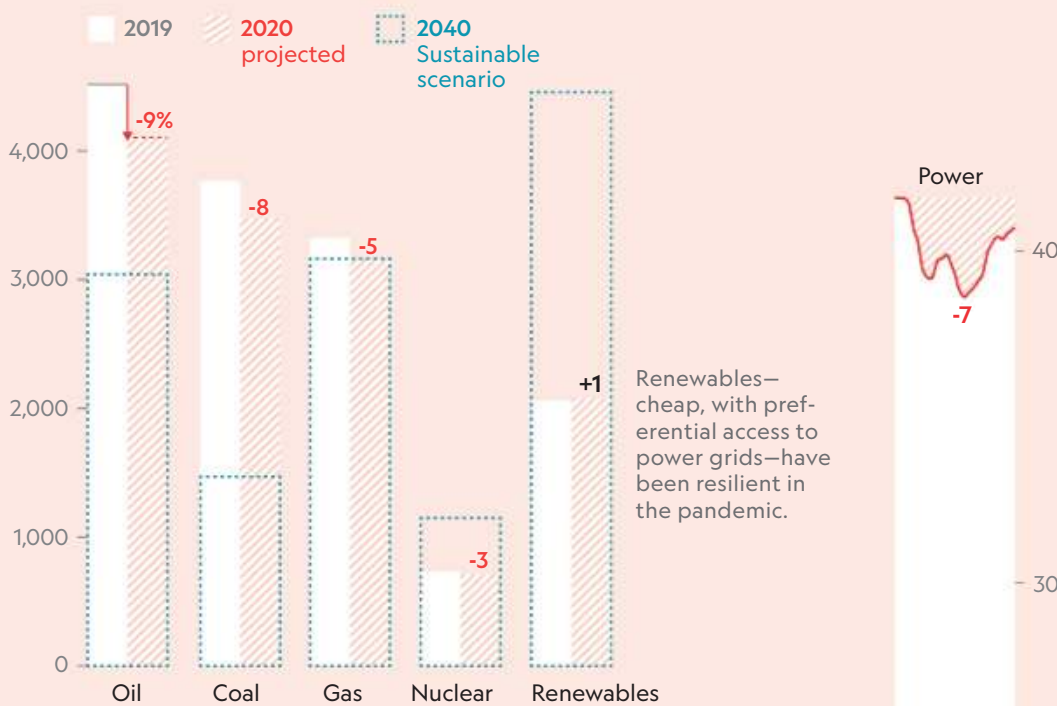
A review of the impacts of COVID-19 on energy sources and sectors shows that to limit warming, we must shift to alternative sources, enhance energy efficiency, and improve the systems that transport and store energy.

## DEMAND BY SOURCE

**2020** Oil use plummeted when aviation and other transport—nearly 60 percent of global demand—were slowed by COVID-19 restrictions.

**2040** In a sustainable scenario, renewables—mostly wind and solar—rise from 14 percent to 34 percent of total energy demand, replacing fossil fuels.

ANNUAL GLOBAL ENERGY DEMAND  
Million metric tons of oil equivalent



## EMISSIONS BY SECTOR

**2020** COVID-driven declines are unsustainable and inefficient, with relatively small impacts on the largest-emitting sectors.

**2040** Emissions fall as electricity replaces fossil fuels in industry and transport; renewables and nuclear power help decarbonize the grid.

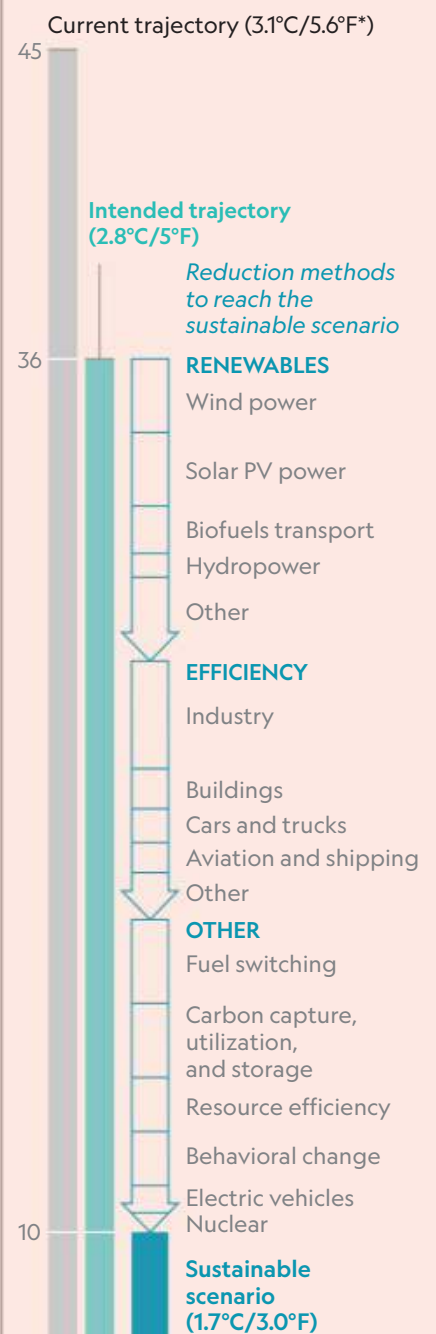
DAILY FOSSIL CO<sub>2</sub> EMISSIONS  
Million metric tons of CO<sub>2</sub>



## CLOSING THE GAP

Existing and future technologies and focused policies could accelerate a global energy transformation.

2050 ENERGY-RELATED EMISSION SCENARIOS  
Billion metric tons CO<sub>2</sub>



\*ABOVE PREINDUSTRIAL LEVELS BY 2100

NGM STAFF; LAWSON PARKER; SCOTT ELDER. SOURCES: INTERNATIONAL ENERGY AGENCY; LE QUÉRÉ AND OTHERS, NATURE CLIMATE CHANGE 2020 (EMISSIONS FROM CEMENT CALCINATION OMITTED)



of the world,” she told me. But in context, Davis thinks, the Hebrew word *radah* meant something very different. If so, Western civilization is based in part on a misunderstanding of one of its founding texts.

There’s no question that Genesis gave special status to humans as the only creatures made in God’s image, Davis explained. But God blessed the other creatures even before us, and in the same way, commanding them also to “be fruitful and multiply.” Whatever *radah* means, it can’t mean “annihilate the blessing,” Davis said. And yet increasingly, that’s what we’ve done: eradicated other species as we’ve subjugated the Earth. Now, by some accounts, we’re reaping the whirlwind in the form of wild-animal-borne viruses such as SARS-CoV-2.

Instead of “have dominion over,” Davis translates *radah* as “exert skilled mastery among the creatures.” God was enjoining us to be skilled craftspeople, she said, following God’s example in creating us, and skilled stewards of creation. Our misreading of that nuance has been consequential—as if an ancient etiquette book had commanded us, on first meeting someone, to touch his cheek lightly, and we had taken that as license to punch him in the face.

The next major plot twist in the Western narrative came in the 17th century, with the Age of Enlightenment. It freed our minds from complete domination by ancient texts but amplified the idea that we should dominate the Earth. One root of the Enlightenment, according to German historian Philipp Blom, lay in the Little Ice Age of the 16th century, a period so cold that an iceberg appeared off Rotterdam and harvests failed across Europe. (6) Religion was no help with crop failures, and people increasingly began to question its authority. They began turning instead for knowledge to systematic learning from observation and experience—that is, to science.

With that, the idea of progress entered Western civilization. And from the start, Blom writes, it was equated with economic growth. Growth had been slow and intermittent before, and it remained so until the industrial revolution of the 18th and 19th centuries. Then, spurred by science and technology—as well as cheap coal and resources extracted from far-flung colonies and places like Alabama—it took off.

In the 20th century, economic growth became an end in itself. During the Great Depression, when economies collapsed and traumatized a

6. The Little Ice Age has been variously linked to volcanic eruptions and solar activity—natural fluctuations unrelated to global warming today.

7. If happiness is the goal, rising GDP doesn’t buy it in rich countries: U.S. surveys show that happiness has stagnated for decades.


generation, an American economist named Simon Kuznets developed a way of measuring the output of an entire nation. Now there was a single seductive number attached to economic growth. After World War II, growing that number, which came to be called gross domestic product (GDP), became an obsession for governments worldwide. “That fixation has been used to justify extreme inequalities of income and wealth coupled with unprecedented destruction of the living world,” writes British economist Kate Raworth.

To sum up: Economic growth, rooted in a misunderstanding of the Bible that was supercharged by the Enlightenment and the industrial revolution, has become our overarching story. Raworth believes that doesn’t serve us well.

What would it look like if the economies of the world were stewarded within limits set by nature? Even to ask the question, and to raise the specter of any kind of limits, amounts to fighting words in some circles. The fight has been going on for half a century, and growth proponents have always had a powerful moral argument: Economic growth has lifted billions of people around the world out of poverty, and billions more still need its benefits.

The point isn’t that all growth is bad, Raworth argues in her book *Doughnut Economics*. Some countries clearly still need much more of it, while others don’t. (7) The point is that growth shouldn’t be the point.

The doughnut illustrates what Raworth thinks should be our purpose. Its outer edge is the “ecological ceiling”—the planetary boundaries defined by Rockström and his colleagues. The inner edge is the “social foundation”—the food, health, education, and other basic conditions of a dignified human life. The idea is to allow everyone on Earth to lead



Urban planting: In this block of Manhattan, a few trees sneak in around 12 stories up.

such a life without ruining Earth for us all.

How do we get there? The doughnut is more of a vision than a blueprint. Raworth sees the varied crises of the 21st century—“financial meltdown, climate breakdown, COVID lockdown”—as all related to the “expansionist human project,” she told me. Changing that project will require a profound cultural transformation, a collective shift in mindset—a shift that the pandemic, terrible as it is, might conceivably favor. “I think this pandemic is pushing us faster toward the future that we knew we wanted,” Raworth said.

You could see faint premonitions of it this year, if you were so inclined. You could see it in the January decision by BlackRock, which manages over seven trillion dollars in assets, to begin divesting from coal, if not yet oil and gas. (“I believe we are on the edge of a fundamental reshaping of finance,” wrote CEO Larry Fink.) You could see the shift too in the European Union’s decision in July to invest 550 billion euros in climate action over the next seven years, or in the proliferation of bike lanes on city streets in Europe and the U.S. Ellen Davis saw it in May when she addressed the Festival of Homiletics, attended by thousands of Christian preachers: This year they had signed up for a week’s online instruction on preaching about climate change. Two-thirds of Americans are worried about it, according to a recent survey—as many as ever, in spite of the pandemic, in spite of the current administration’s indifference.

There are social tipping points as well as climate ones, a team led by Ilona Otto of the Potsdam Institute concluded in a paper published in early February in the *Proceedings of the National Academy of Sciences*. Change can start in a boardroom, or in government, or on the streets. (“In times of upheaval,” Blom writes, “new stories grow through cracks in the concrete of official truth, strengthened by uncertainty.”) Wherever the change starts, it can sometimes, for reasons scientists can’t readily predict, spread contagiously, as people are inspired by the example of others. A small minority can tip the rest of us.

Of course, the tipping angels might not be our better ones: In this terrible year especially,

8. In May, 38 global cities belonging to the C40 network pledged to shun “business as usual” as they recover from a pandemic with “roots in environmental destruction.”

we might easily be tipped by fear toward retrenchment and restoring the status quo. Raworth is focusing on cities, trying to persuade them to “emerge from this emergency” with a new direction. (8) In early April, in the midst of its own shutdown, Amsterdam became the first city to adopt her doughnut model, pledging to consider the full range of impacts—ecological and social, local and global—of everything it does. To start, it said it would cut its use of raw materials in half by 2030.

“People are drawn by stories that give them hope, give them hope of

## RETHINKING OUR WORLD

# ONE PLANET, TWO CRISES



Public concern in the United States about global warming hit an all-time high last November, according to researchers at Yale and George Mason Universities. Large majorities of Americans think human-caused global warming is real, and they feel worried and even personally responsible. Surprisingly, a survey in April found that COVID-19 hadn’t displaced concern over the climate—though it had reduced media coverage of it. “The issue seems to have matured, seems to have solidified,” Anthony Leiserowitz of Yale said. “I think that’s a really encouraging sign.” —ROBERT KUNZIG

a secure future where they matter,” Raworth said. “And this is one in which we reconnect with the living world, we reconnect with our community, and we ask big questions about what it means to thrive.”

● **IN 1963, WHEN** Martin Luther King, Jr., brought the civil rights campaign to Birmingham—a tipping point in the fight against segregation—it had been exactly one century since Lincoln’s Emancipation Proclamation. It also was one century since John T. Milner had opened the first mine on Red Mountain, to supply iron to the Confederacy. In 1962 U.S. Steel

Economic recovery plans today will determine our climate's future.

# To really go green, go big

Governments are making decisions that will shape infrastructure, industry, and the climate for decades. Stimulus packages offer a unique opportunity to boost economic growth while building a more sustainable future.

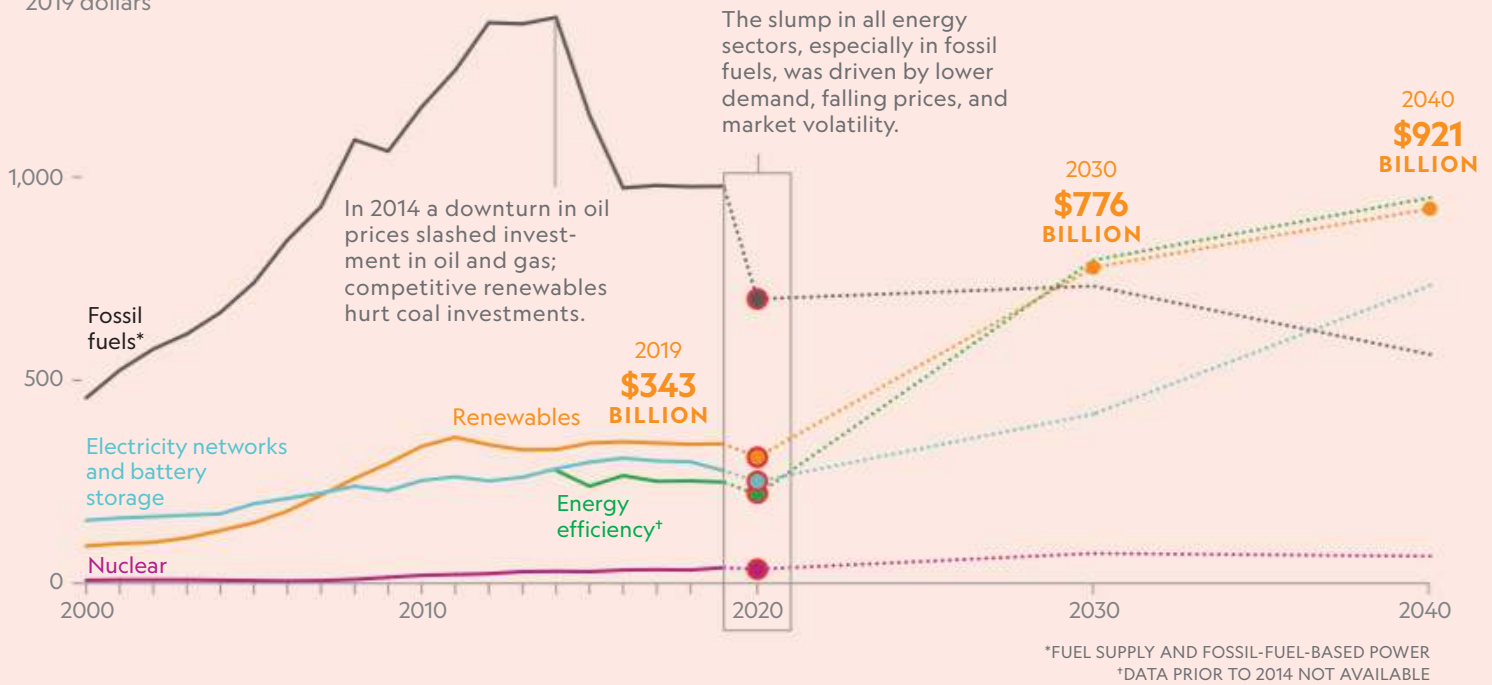
## PANDEMIC IMPACT ON ENERGY INVESTMENT

Energy investment had been projected to grow in 2020, but COVID-19 has put the world on track for the largest decline on record: a reduction of one-fifth—nearly \$400 billion—compared with 2019. Fossil fuels accounted for almost all of the loss.

**HISTORICAL** drop in investments in fossil fuels

World energy investment

\$1,500 billion – 2019 dollars



## WHAT'S TO GAIN BY GOING GREEN

The increasing affordability of renewables and the potential for millions of new clean-energy jobs are two benefits for governments to consider when structuring COVID-19 economic recovery plans.

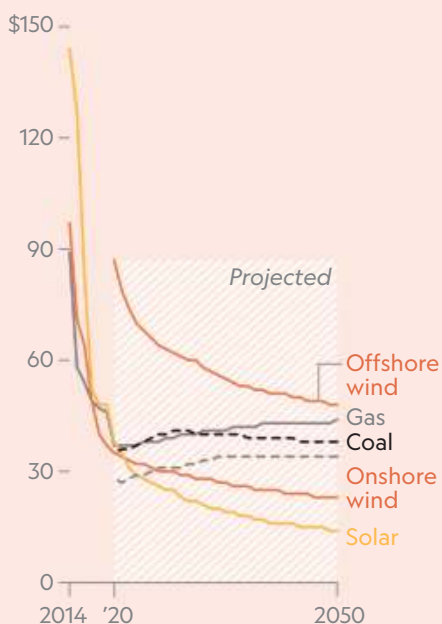
### CHEAPER ENERGY

In about two-thirds of the world, wind and solar are the least expensive new energy sources.

### Cost of electricity, United States

Dollars per megawatt-hour, 2019 dollars

— New capacity  
-- Existing capacity

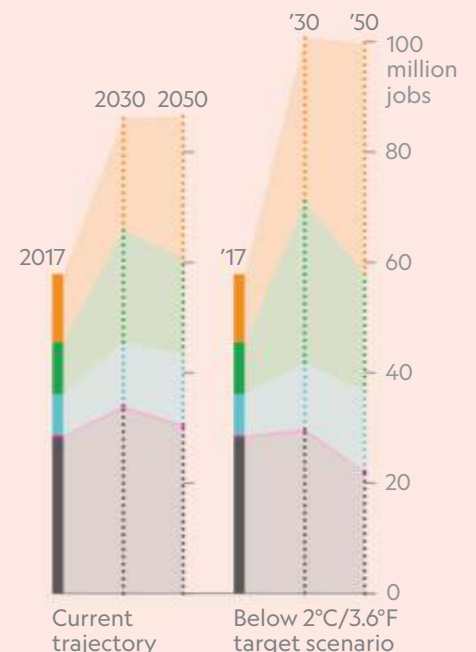


### SUSTAINABLE JOBS

A swift, broad shift to clean energy could create seven million more jobs than the trajectory we're on.

### Global energy-sector jobs

Renewables  
Energy efficiency  
Energy flexibility and grid  
Nuclear  
Fossil fuels



closed the last one. For 99 years that stretch of ridge on the southwest side of Birmingham had been ravaged.

“There was nothing on that mountain” back then, said Wendy Jackson, the former director of the Freshwater Land Trust, a local environmental organization. “No trees. Nothing except the mining operation.”

By the time Jackson first walked around it in 2004, the land had been left alone, except for people dumping trash, for more than four decades. Forest had grown back. Kudzu had washed up the sunlit slopes like a green tide and draped the forest’s edge. This was not pristine nature—but it was nature resurgent. And hidden in the woods were the crumbling mine shafts where a century’s worth of miners, Black and white, had descended into the mountain each morning, following the sloping seam of iron ore ever deeper. Trees grew from the windows and fallen roofs of the concrete bathhouses where the men had rinsed the red dirt off at night. You felt, Jackson said, “like you were as close as you could be to touching the past of Birmingham.”

In 2005 she and the Freshwater Land Trust negotiated a deal with U.S. Steel to buy 1,100 acres of the mountain and convert it into a park. Red Mountain Park opened in 2012. In the early years my wife and I went only a few times; it wasn’t on our radar somehow. (9) Then the pandemic hit. Now we hike there just about every Sunday morning. The park is within the city limits but large enough—1,500 acres now—that we can disappear into the woods and be alone with the birds and cicadas. When the heat sets in, we rest in the cool draft from a mine entrance. And with the steel industry much diminished, and cars less polluting, the view from the top, out over the valley, is clearer than in the old days.

Early one morning this summer I went for a walk with Jerri Haslem, the park’s first Black senior staff member, recruited just last year. She was born in 1963 in Birmingham, she told me as we walked along the bed of the short-track railroad that once hauled iron ore to the mills. The daughter of a steel-industry worker, she was born in a Black maternity ward in a hospital basement, into a city that had preferred to close its parks rather than desegregate them. She was born two days after white segregationists bombed the 16th Street Baptist Church, killing four little girls—an infamous crime that helped tip the country toward

9. “The greatest threat to the environment is the disconnect between people and nature,” Wendy Jackson said. “The only way you conserve something is if you love it.”

passage of the Civil Rights Act.

Haslem had just ditched a corporate career to work as a motivational speaker on health when the director at Red Mountain, T.C. McLemore, persuaded her to come help him try to expand its reach. In its early years, they both told me, the park had aimed to be an adventure destination for trail runners, mountain bikers, and zip-liners.

“This was a park for people from Homewood,” Haslem said, referring to the predominantly white suburb where my wife and I live. “But the park sits in Birmingham!”

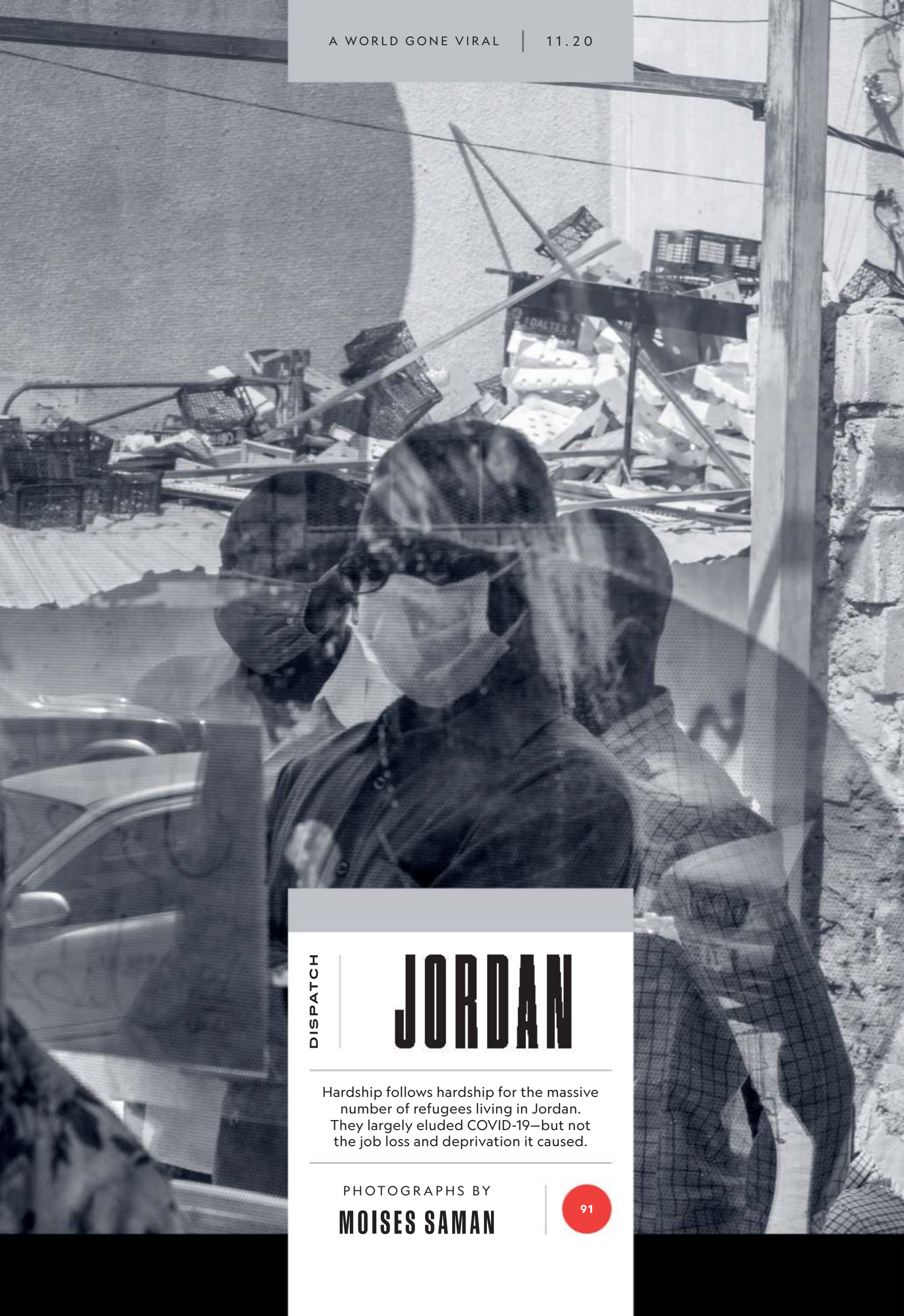
The pandemic has hit Birmingham hard. By this summer the city was facing a \$63 million hole in its budget because of tax shortfalls from closed businesses, and the virus was surging. Red Mountain also was facing a challenging future, McLemore said; it’s a public-private partnership with little public funding. Yet the pandemic had also been good to the park: Attendance was at all-time highs even though the zip line and climbing center were closed. Black residents were coming as never before, Haslem said, some through a new entrance on the north side, the Birmingham side. They were coming to get out of their houses, to walk in nature, to “listen to the damn birds.”

“It’s got to be a lot of different forces,” Haslem went on. We were talking now about how this seed of something new might thrive. “It’s got to be the government, the community, the average joe, the rich joe. It’s got to be everybody. If you have only poor people come, it’s not going to make it. If you only have rich people, it’s not going to make it. It’s got to be everybody. And it’s organically happening, because of COVID.” □

Environment editor **Robert Kunzig’s** last feature was about the circular economy. Bay Area artist **John Chiara** designs and builds his own cameras.



In Jordan, home to one of the world's highest concentrations of refugees, Sudanese wait their turn to redeem vouchers at an Amman grocery. The country's pandemic curfews and economic downturn hit refugees especially hard; most legal work sectors are closed to non-Jordanians.



DISPATCH

# JORDAN

Hardship follows hardship for the massive number of refugees living in Jordan. They largely eluded COVID-19—but not the job loss and deprivation it caused.

PHOTOGRAPHS BY  
**MOISES SAMAN**



Syrian refugee women form properly spaced desert queues in anticipation of UNICEF donations—hygiene kits and other necessities. Their families live in a tent settlement on the outskirts of Al Mafraq;





hundreds of thousands of other refugees live in special camps or urban neighborhoods. Social distancing in those more crowded areas is an unattainable luxury.

BY CYNTHIA GORNEY

**A**

**AT FIRST THE** government shut down nearly everything: borders, businesses, schools, civilian presence on the streets. Tanks and army trucks backed up an around-the-clock lockdown—no exceptions, even to shop for food and medicine. Amman is built on hills, and from his kitchen, photographer Moises Saman could hear the echoes of citywide sirens, the kind used for air raid warnings. He stayed inside with his family until the curfews began to ease, during prescribed daylight hours only, for certain approved purposes only. Then he went to find the places where refugees live.

About 750,000 recent refugees are in Jordan now, grouped into designated camps or scattered into settlements and neighborhoods. They come from as far away as Somalia and Sudan, but the vast majority are Syrians escaping civil war. Photographing inside makeshift dwellings and urban apartments last spring, often in the company of UNICEF workers, Saman saw that the terrible scenarios initially envisioned in the settlements' crowded quarters—the coronavirus spreading uncontrollable sickness and death—had been averted. Jordan's strict lockdown measures, along with aggressive contact tracing, appeared to have kept the pandemic at bay: Only 15 COVID-19 deaths were confirmed as of late August.

The lockdown's aftermath, especially for people desperate enough to have fled their home countries, was more complicated. Layers of hardship can accumulate until it's hard to separate one from another. The pandemic slammed the economy, wiping out informal work that many refugees depend upon. The abruptly closed schools and community centers had been safe places of support for refugee children—especially girls, for whom an ongoing education is the surest protection against early marriage. When lessons moved online and began airing on national television, children with no computer access were trying to complete schoolwork and take exams on their household's only screen: the family mobile phone.

Smartphone homework uses data; replenishing it costs money. To the list of donation items made crucial in this pandemic—soap, buckets, pencils—UNICEF added a very modern form of aid: data allowances, loaded from afar, to help determined children stay in school. □

For refugee and other marginalized children, such as these girls from Jordan's Dom ethnic minority community, schools and help centers provide support lifelines. But those facilities closed for months during the pandemic.



### OUTBREAK RESPONSE

Jordan's COVID-19 outbreak dates from March 3, when its first confirmed case was reported. Strict government policies began on day 16 of the outbreak, and an around-the-clock curfew was imposed on day 19 for three days. The toll by day 100: nine reported deaths.







In the Irbid Camp settlement, home to some of the more than two million Palestinians living in Jordan, national health ministry workers find an obliging participant during a day of random



COVID-19 testing. By late summer, with severe lockdowns eased, this country of more than 10 million people had recorded only 15 deaths from the coronavirus.



---

**LEFT:** For Syrian refugees, pandemic repercussions added one more burden to an already tough existence. In the Mafraq settlement, a mother watches her sons with

contents of a UNICEF donation box. Their father's work as a laborer, like much of the informal work done by refugees, vanished during the shutdown. **BELOW:** Taking new

precautions before his rounds, this Doctors Without Borders nurse layers up inside an Amman hotel that rents rooms to house recovering postsurgical hospital patients.





When Amman's Grand al Husseini Mosque opened after months of lockdown, so many people arrived that an overflow crowd gathered outside to worship. Both inside and out, individual rugs were carefully





distanced. Concerns about safety, and requirements for social distancing, overrode the Islamic instruction that group prayer be conducted shoulder to shoulder.



A breeze, a rooftop, and at least one thing over which he has control: A young Jordanian takes a quarantine moment for himself. During lockdown the Amman skies were often dotted with kites,

many homemade. To encourage a form of social distancing, some businesses gave out kites printed with



of recreation that didn't require exposure to crowds, their logos and an admonishment: stay home.

103

DATA SHEET

## Price of a Pandemic: Poverty Spreads Around the Globe

By the end of 2020, about 100 million additional people are projected to find themselves in extreme poverty, living on less than \$1.90 a day. Millions more are slipping into less extreme poverty tiers. Continued lockdowns could worsen these already grim projections in 2021.

INFOGRAPHIC BY

ALBERTO LUCAS LÓPEZ

104

Each country's red, yellow, and blue bars show the change in population share across three poverty tiers. All bars start in early 2019 and are projected to December 2020. See key for details.

PERCENTAGE OF POPULATION →

**BELIZE.** Dependent on tourism, thousands lost jobs because of travel bans. Those living on \$190 a day could rise from 14 to 24 percent by year's end.

**LIBERIA.** From 2000 to 2019 Liberia made progress providing safe water, education, and electricity to the poor. Those gains are now in danger.

**PERU.** Without a strong social safety net, neighbors pooled resources in Lima to buy enough food; employment under lockdown was strictly limited.

**TIMOR-LESTE, SAMOA.** Pacific island nations have low rates of infection. But without tourism and trade, over a million islanders may fall into extreme poverty.

**SYRIA.** Four out of five Syrians live in poverty after years of war and displacement. Fewer jobs and higher food costs made their dire situation worse.

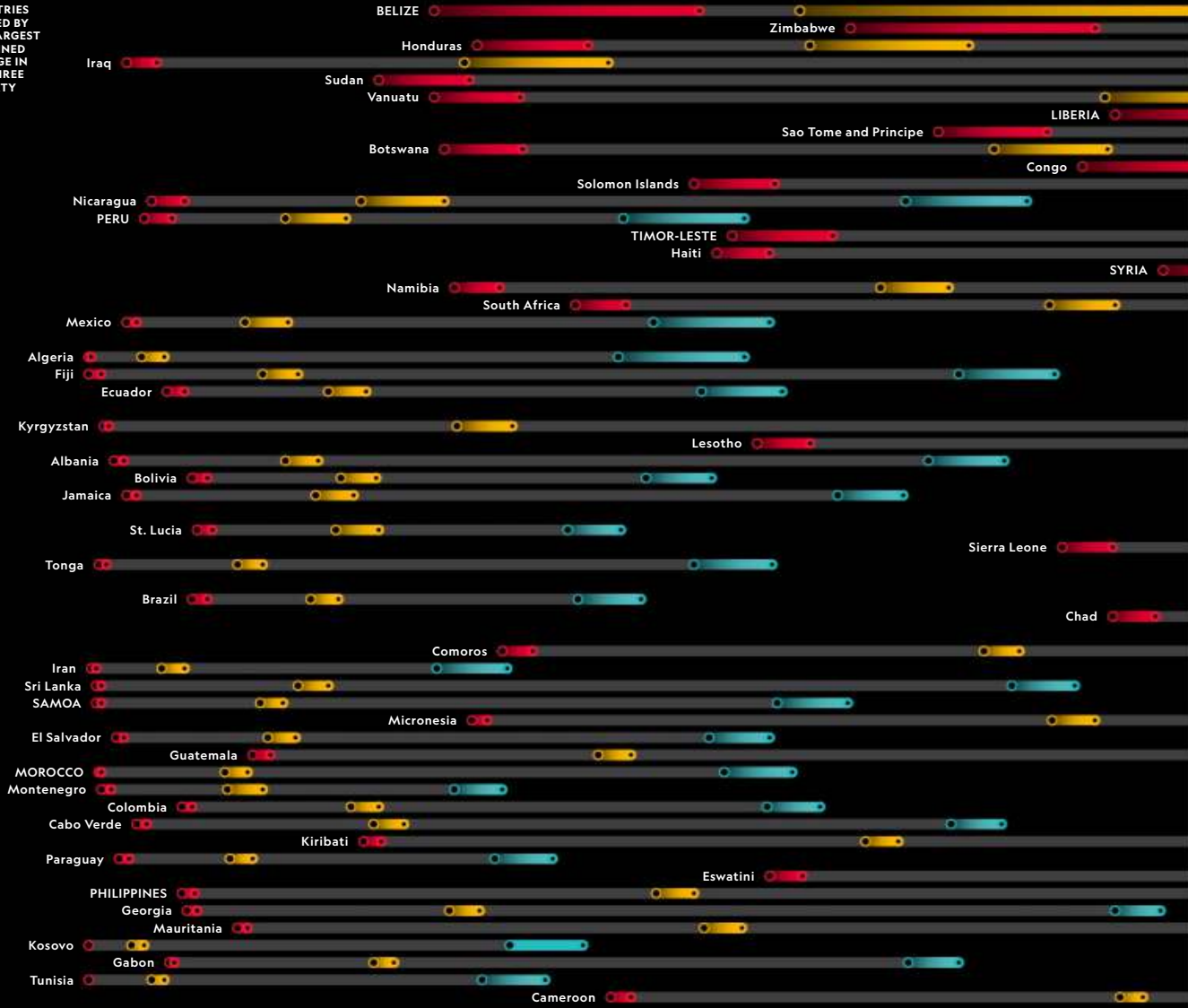
**SOUTH SUDAN.** Five decades of war shape the poverty rate more than COVID-19; 12 million go hungry each day and 4.2 million children are homeless.

**NIGERIA.** Food costs rose as much as 50 percent even as already high unemployment rates increased, fueling unrest in Nigeria during its lockdown.

**MOROCCO.** West African migrants found themselves stuck and jobless here, unable to enter Europe and with little official aid during lockdowns.

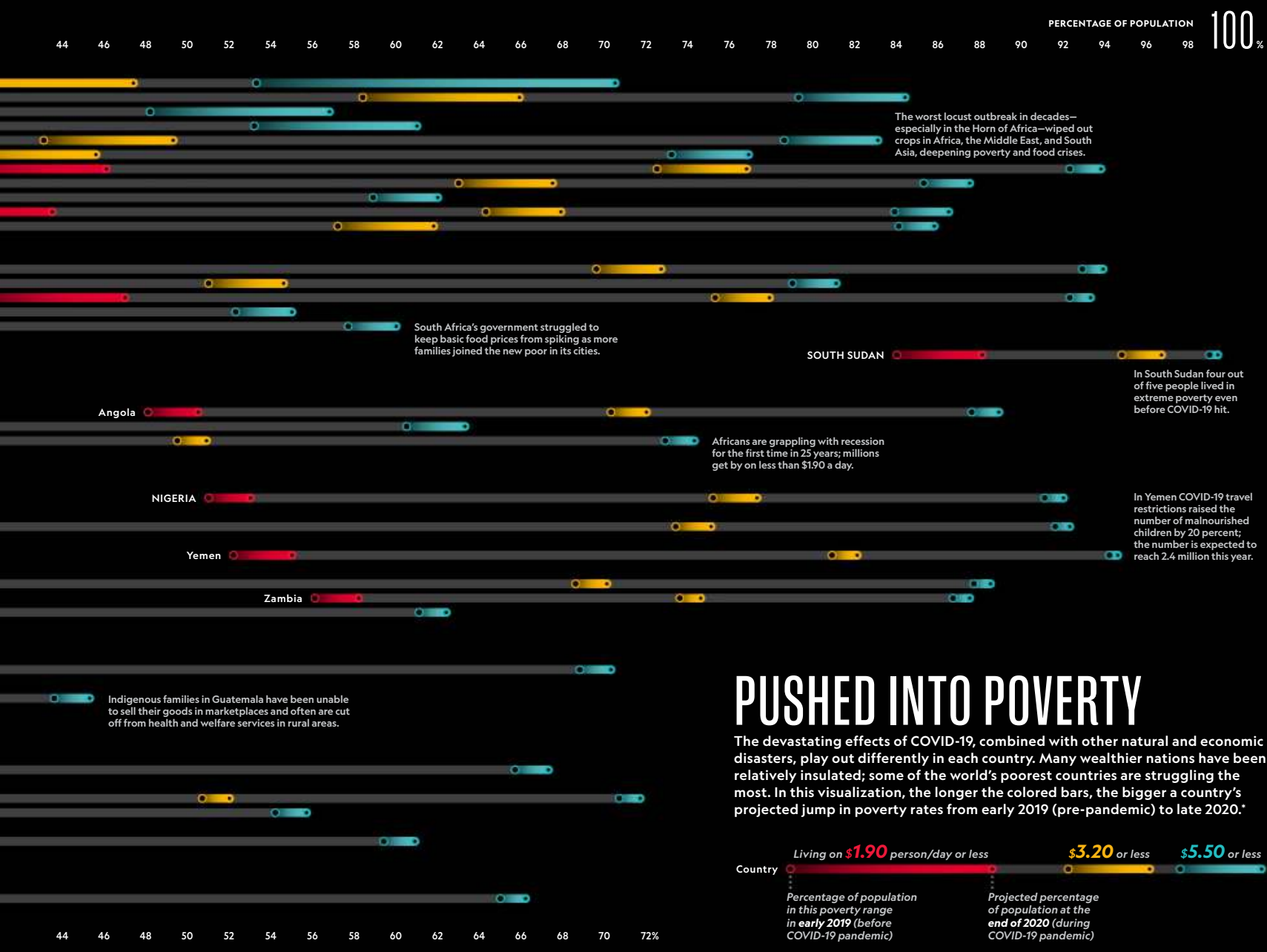
**PHILIPPINES.** Millions depend on remittances from workers outside the country. In May lockdowns cut those lifelines by 19 percent, compared to 2019.

COUNTRIES RANKED BY THE LARGEST COMBINED CHANGE IN ALL THREE POVERTY TIERS



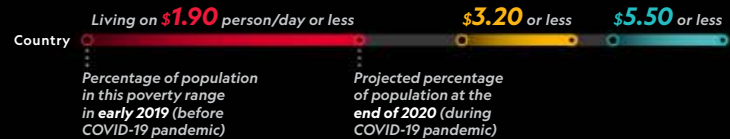
PERCENTAGE OF POPULATION →

\*BASED ON A MIDYEAR ANALYSIS OF LOW- AND MIDDLE-INCOME COUNTRIES; DATA UNAVAILABLE FOR INDIA, PAKISTAN, AND SENEGAL.  
ALBERTO LUCAS LÓPEZ, NGM, SHELLEY SPERRY. DATA SOURCE: LAKNER, C., ET AL., "HOW MUCH DOES REDUCING INEQUALITY MATTER FOR GLOBAL POVERTY?" JUNE 2020. FINDINGS ARE THOSE OF THE AUTHORS, NOT WORLD BANK.



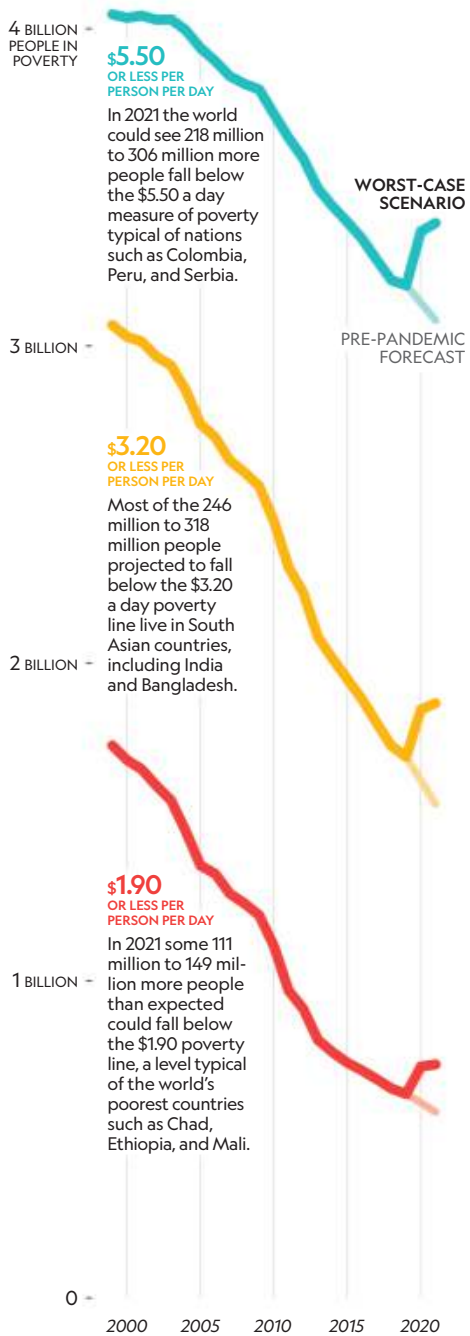
# PUSHED INTO POVERTY

The devastating effects of COVID-19, combined with other natural and economic disasters, play out differently in each country. Many wealthier nations have been relatively insulated; some of the world's poorest countries are struggling the most. In this visualization, the longer the colored bars, the bigger a country's projected jump in poverty rates from early 2019 (pre-pandemic) to late 2020.\*



### THREE THRESHOLDS OF POVERTY

The World Bank categorizes poverty into three tiers based on data provided by individual countries: **\$5.50** a day, a threshold typical of middle-income countries; **\$3.20** a day, as seen in lower-middle-income countries; and **\$1.90** a day in the world's poorest countries (considered extreme poverty).



SOURCE: WORLD BANK



Dusk, rain, anxiety: As the government begins announcing sweeping pandemic orders in March—school closures, an international flight ban, a nighttime curfew—residents hurry to find shelter from the rain in the crowded Kibera district.



DISPATCH

# KENYA

COVID-19 stalks victims in Nairobi, from affluent compounds to the cramped informal settlements where hundreds of thousands are especially vulnerable.

PHOTOGRAPHS BY

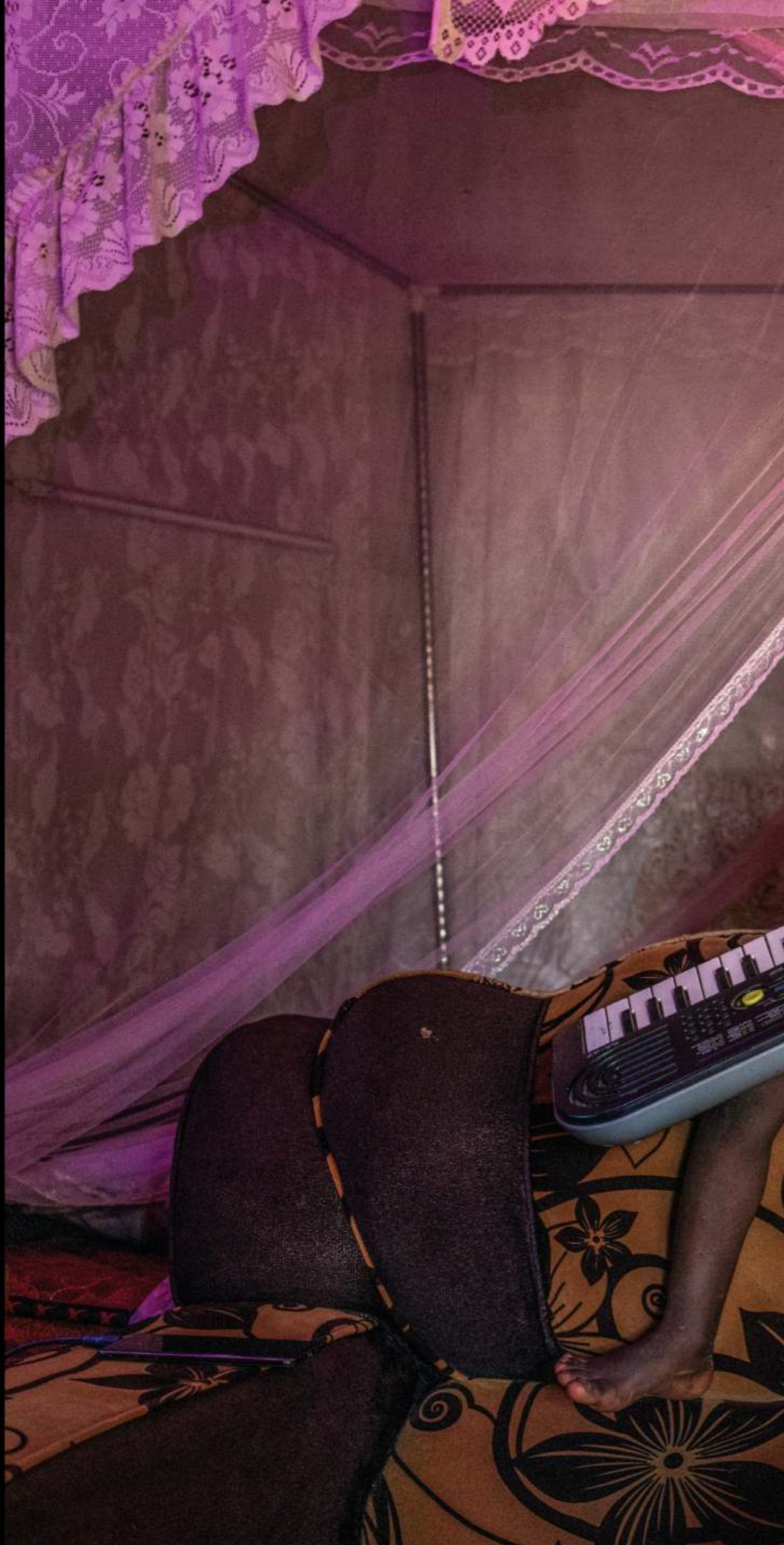
**NICHOLE SOBECKI**

111

---

Musician Daniel Owino Okoth, aka Futwax, sings at his home in Kibera with his son (and apprentice keyboard man) Julian Austin, four. They're doing a rendition of Futwax's song "Have You Sanitized?" A catchy public service message in the local language called Sheng, the song pleads with Futwax's fellow Kenyans to look after themselves and each other during the pandemic.

---







BY CYNTHIA GORNEY

**FROM THE KENYAN CAPITAL,** *two voices on Nairobi and the pandemic.*

**F** **DANIEL OWINO OKOTH:** My aka name is Futwax. I'm a recording artist, a sound engineer, a community leader, and I was learning music production. I have a family: a son and a wife. In Kibera we have many stories to tell about how we are living our lives, you know? We tell them through music, through art, and I was doing gigs, traveling outside the county, performing in schools. Teaching people about Kibera, about ghettos around the world. Things were good when the corona was not around. I was hoping to do music videos, but then the corona came.

**NICHOLE SOBECKI:** Kibera is one of more than a hundred informal communities, as I call them, in Nairobi. I know people use the word "slum," but these are named places that are deeply creative and entrepreneurial. Kibera is one of the biggest in Nairobi, and on a normal day commercial streets would be bustling with businesses, restaurants, hotels, and shops selling vegetables and meat and used clothing. Energy and hustle. Nairobi is built on hustle. I've called this city home for nine years, and it's a very exciting place to be. Futwax is a great example: He's a former Mr. Kibera—that's an annual contest they hold. If you know Kibera, you know Futwax, and early into the pandemic, he realized this was going to be a very real issue for his community.

**DANIEL:** We can't travel, so it messed up my gigs. And here in Kibera, we don't have "social distance." We share toilets. We share entrances and exits of houses. We share where we iron our clothes after washing. We don't have supermarkets; we share kiosks. We saw people who were taken away by ambulance, people from the slums who were put into government isolation centers, you know? So I decided to take responsibility in my own hands. I went to the management at Kibera Town Centre.

**NICHOLE:** The Town Centre opened a few years ago, in the heart of Kibera. It's a community-operated space—clean water, laundry, bathrooms, skills training, access



## OUTBREAK RESPONSE

Kenya's COVID-19 outbreak dates from March 14, when its first confirmed case was reported. On March 27, the government implemented a nighttime curfew from 7 p.m. to 5 a.m. The toll by day 100: 121 deaths.



\*SEVEN-DAY AVERAGE

---

**BELOW:** Wearing team-  
logo hazmat suits,  
these footballers from  
the Ngando Youth  
Sports Association  
volunteered as a  
disinfecting brigade.  
Like athletes around

the world, they lost  
months of matches and  
training to the pan-  
demic. **BOTTOM:** For  
this father and son,  
self-quarantine means  
practicing swings  
from the roof of their

Nairobi apartment  
building. The exclu-  
sive Muthaiga Country  
Club, where they usu-  
ally golf, announced  
a temporary closure  
last spring, "to keep  
our country safe."





Determined to help propel Kenya's vigorous fashion industry despite pandemic restrictions, stylist Wambui Thimba models in her apartment for roommate and photographer Barbara Minishi. Thimba's



ensemble is a creation by Kenyan designer Laviera, who explains the garment on Instagram: "You really don't have to do much with a statement blazer. It does all the work for you."

to credit and computers. It's also a gathering spot, with a surrounding market, so they've set up speakers outside for music and messages. Now Futwax is often on the decks there or walking through the community with a megaphone, talking about the coronavirus and how to keep one another safe.

**DANIEL:** The center has a recording studio where I was learning music production, and at the beginning of the pandemic, they closed it. But I said we could record corona radio jingles in different languages. They said OK, if you are careful to bring people in only one at a time and disinfect in between. So with people who speak Luo, Luhya, Swahili, Kisii, and Nubian—we have many languages here—I recorded them saying: Please wear a mask! If you are sneezing, kindly sneeze on your elbow or arm! If you are talking with someone, kindly talk from a distance!

**NICHOLE:** His own song is really catchy, and it's been being played not only in Kibera but around other parts of Nairobi as well. He understands people's concerns here and speaks Sheng, among other languages. Sheng is Nairobi's urban language, a dynamic Swahili-based slang that can vary neighborhood by neighborhood, month by month. We often see imposed public health messaging, outsiders trying to come in and educate a community—but actually, what he's doing resonates so much more powerfully.

**DANIEL:** People who said they didn't want to sanitize, to wear a mask—this hurt me in the heart. I'm asking people: What responsibility are you taking as a citizen? As a businessman, when you are serving your customers, are you telling your customers to pay the electronic way? Do you have a handwashing station? So I went into the studio and expressed it in lyrics. I'm sensitizing the community, mixing my languages, some good Swahili, some English—and I'm talking that Sheng. A *mama mboga* is a small businesswoman who sells vegetables. A *wochi* is a watchman. *Wewe* means you, like, “Hey wewe, Nichole!” □

### “Have You Sanitized?” by Futwax (chorus)

*Have you sanitized, mama mboga wewe?*  
*Have you sanitized, wochi wewe?*  
*Have you sanitized, businessman?*  
*Have you sanitized, ghetto gal, ghetto boy boy?*  
*Have you sanitized, president, policeman, traffic police?*  
*Have you sanitized, preachers preachers?*  
*Have you sanitized, worldwide worldwide worldwide*  
*worldwide worldwide?*

---

Like other major cities, Nairobi is home to deep extremes of affluence and poverty. **BELOW:** In a suburb of grand homes and high-end shopping, yoga instructor Oriane

Torode leads a workshop on immunity. COVID-19 rules have her teaching mostly online now; a few students still visit in person. **BOTTOM:** Their studio shut for quarantine,

Eugene Ochieng, 12, and friends turn an alley into a ballet floor. Home computers are rare in crowded Kibera; here, the dancers' coach is a borrowed cell phone on stilts.





In the dim light of their temporary lodgings in a friend's storage room, Patrick Mwangi and his wife, Regina, huddle with daughters Lucy, one, and Peace, five. Their Kariobangi North home, and Patrick's samosa stall,





were bulldozed in a mass eviction to make way for development. Between that blow and the pandemic, "everything was shattered," Patrick says. "Since then, I have nothing."

In full protective gear, Sterling Johnson sanitizes a Bay Area Rapid Transit train at a facility in Concord, California.



# How a Virus and Social Unrest Became a Test of Our Humanity

---

COVID-19 has changed how we live and work, shattering some of our most treasured rituals. But along with the worldwide protests for social justice, it also has reminded us of the desperate need to address inequities in our society—and to better protect the most vulnerable among us.

---

ESSAY BY

**PHILLIP MORRIS**

123

**RUBY MOSS SOMEHOW** found the strength to drop to her knees in prayer. Although severely weakened herself from the virus, she cried out to God to plead for the life of Adolphus Moss, her husband of 32 years.

He was deteriorating rapidly. A nurse had just called from a hospital in Tuscaloosa, Alabama, to warn that even with a fully engaged ventilator, Adolphus could no longer breathe.

“Hear my cry, O Lord. Spare his life,” Ruby repeated desperately. Several minutes into her prayer for a miracle, her answer was delivered: “I’m sorry. He didn’t make it,” said a voice on the other end of the phone.

A graveside ceremony was held for Adolphus Moss at Fourth Creek Baptist Church Cemetery in York, Alabama, in April. Without fanfare or a public commemoration of his life, Moss, 67, a deacon in his church and respected civic leader in his rural community, was ushered into the ground. His entire service lasted 10 minutes.

“I wasn’t able to give my husband the kind of home-going service he deserved,” says Ruby, who has written a small legacy book honoring her late husband. “We were told 10 people could attend and that two would be funeral officials. It seemed like we were in a whole different world. It didn’t seem real.”

The year 2020 has brought unimaginable change to the way we live, and the way we die. The dying die alone. Survivors grieve in solitude. The death ritual has changed beyond recognition. The Irish wake, with its tradition of an open coffin surrounded by people singing, hugging, and toasting the departed, is now severely curtailed. The long-celebrated African-American custom of funeral repasts after home-going ceremonies—a practice dating back to slavery—has largely come to a halt. Ritual

body washings of the deceased, widely practiced by Eastern and Middle Eastern faiths, are performed in protective equipment, if at all. Final breaths now are routinely taken without the comfort of a familiar touch or parting hug. COVID-19 has turned death into the loneliest journey of the shared human experience.

“Funerals are enormously essential in navigating grief,” said William Hoy, clinical professor of medical humanities at Baylor University. “A Zoom funeral is not the same. I fear there will be a heavy price to pay for our inability to rub shoulders, shed tears, and mourn in the same physical space.”

Hoy pointed out that “some survivors who lost family during the 9/11 terrorist attacks have yet to recover from the fact that the bodies of loved ones were never found or properly laid to rest. The grief-stricken absolutely require the human connection.”

It has become painfully clear that the virus has altered life as we know it.

Along with leaving a staggering body count, the virus also has stolen the most basic treasures of our shared experience. Well-established routines involving work, education, and family life are strangely disfigured, daily habits capsized. The ceremonial mile markers that register achievement have been shredded. Since March, we frequently have engaged in unusual behaviors, such as panic shopping for toilet paper or quarreling with strangers over the probity of wearing face masks in public.

Structural inequalities and misaligned cultural values of societies around the world are being examined and judged. What is essential work? Who is an essential worker? And why are the working poor disproportionately on the front lines and so inadequately protected?

1. Globally, 61 percent of people work in the informal economy in such jobs as domestic helpers, street vendors, delivery drivers, and day laborers.

● **AN ESTIMATED 1.9 MILLION** tourists descended on Rio de Janeiro, the ocean-side metropolis, for a week of partying in February. The revelers likely were not thinking about the plight of the poor as they consumed caipirinhas, the national drink of Brazil, and frolicked along the famous beaches of Copacabana. But the tens of thousands of people who gathered at the Sambadrome Marquês de Sapucaí, a downtown stadium, to watch a succession of 13 parade ensembles on the last Sunday of Carnival were treated to a celebration of poor Brazilian women.

Unidos do Viradouro, a prestigious samba school, used its performance to pay tribute to impoverished Black women laborers known as the washerwomen of Salvador, Brazil, who were descendants of enslaved Africans. In the furiously contested parade competition, Unidos do Viradouro was judged the best in show. Its performance was celebrated by an international audience, which sensed, perhaps, an affinity for and connection to the vulnerable and the poor.

The feel-good moment ended abruptly.

Brazil recorded its first case of COVID-19 the same day. A 61-year-old businessman who recently had visited northern Italy went to a São Paulo hospital complaining of fever, cough, and a sore throat. He was Latin America’s patient zero. His infection signaled to disease specialists that the coronavirus already was likely sweeping across South America. Medically and economically vulnerable hosts for the virus, such as the washerwomen, or laundresses, now commonly known as *lavadeiras*, and millions of others crowded into Brazil’s favelas, suddenly were at dire risk.

If humanity is to ultimately prevail over COVID-19 and viruses yet to come, the poor and the socially disenfranchised—the washerwomen—must be included in the safety net that sustains us all. (1) Brazil was second only to the United States as of late August in total number of infections and confirmed deaths.

COVID-19 is a cunning virus. Those who suffer long-standing social inequities steeped in class, caste, race, and wealth are especially vulnerable. It exploited preexisting conditions. And when it intersected with the civil unrest that exploded in the United States in the summer, overlapping crises unfolded. While a novel virus attacked lungs, a much more familiar virus continued to wage war on Black lives. After watching George

Floyd slowly die under the knee of a Minneapolis police officer, the world reacted with fury and resolve. From the Middle East, Europe, and the most unexpected parts of rural America, the chant “Black Lives Matter” was heard. (2)

The statement brought global recognition to the concept that life is interconnected, sacred, and must be protected. A cross section of demographics and widely diverse cultures decided to no longer stand silent in the face of systemic police abuse and latent white supremacist views. That’s when statues began to topple and long-revered names were removed from university buildings.

It all revealed something simple that we now have to confront: In order to survive this virus, and others in waiting, we must become a more fair and just collection of societies. An obvious truth has been exposed: In viral warfare, humanity is as strong as its weakest link. Our collective survival depends on an ability to develop a far greater appreciation for the direct relationship between universal health and social justice. It also requires a willingness to take decisive steps to alleviate the never ending pandemic of crushing poverty that is the Achilles’ heel of the planet.

● **SOME UNDERESTIMATED** the virus and considered

it manageable if not benign. The world has watched the ebb and flow of its attacks and often reacted tragically. As infection rates skyrocketed, Bishop Gerald Glenn, 66, a prominent evangelical pastor in Chesterfield, Virginia, exhorted his congregation on the fourth Sunday in March not to fear the virus. Like many ecumenical leaders, Glenn, a former police officer, didn’t heed the advice of Virginia governor Ralph Northam and others who warned against gatherings of more than 10 people.

“I firmly believe that God is larger than this dreaded virus,” Glenn told his parishioners. “If I had to deliver my own eulogy, I’d say, ‘God is greater than any challenge you and I face.’ That would be my epitaph.”

Glenn died from COVID-19 three weeks later. His religious faith never appeared to waver, but

2. A Black Lives Matter protest occurred in 40 percent of U.S. counties, in 60 countries, and on every continent except Antarctica.

neither did the deadly resolve of the virus.

Weeks later, the annual hajj was reduced to skeletal proportion to counter the inestimable health risk posed by the five-day religious ceremony. The pilgrimage, which all physically and financially able Muslims are obliged to make once in their lives, constitutes one of the five pillars of Islam.

Normally, upwards of two million pilgrims make the journey to Mecca each year. This year the crowd was limited to a thousand people. The virus’s ambush of a world religion

RETHINKING  
OUR SOCIETY  
**BALANCING  
WORK, LIFE**



The future of work won’t be fully remote, but it won’t be clustered in offices, either. “It’ll be a hybrid,” says Martine Ferland, CEO of Mercer, a human resources firm. Smaller offices will be hubs for occasional in-person collaboration, while enhanced digital tools—such as better video chatting—will support workers at home. And more emphasis on balancing productivity with personal needs will allow employees to organize their work hours to fit their schedules. Flexibility, Ferland says, will be the ultimate job perk. —DANIEL STONE

that is embraced by nearly two billion people laid bare its sinister mode of attack. It targets not only the bodies of victims but also the spirit of those forced into separation and isolation.

A devoutly religious man in Columbus, Ohio, posted a song on Facebook last summer that he hoped would cheer and comfort many of his lonely and elderly friends. My father, who turned 78 in June, used the occasion of his birthday to pick up his ever present acoustic guitar. He stood in front of his computer and recorded himself performing a song he wrote 30 years ago. He called the song “God’s

been good to me.” It was a song of praise and gratitude.

Frank Morris, who once pastored a small country church in the foothills of Appalachia, was distraught about the reality that he no longer could safely attend weekly worship services or celebrate his birthday with loved ones. That didn’t stop him from trying to connect with others.

After viewing the video, I asked my father why he made it and then chose to share it. His answer was simple.

“I wanted to reach out to people who are worried or sick and let them know that I was thinking about them and that they are not alone. I wanted them to remember the Psalms of David: ‘I have not seen the righteous forsaken or their seed begging bread,’” he said, paraphrasing a scripture I’ve heard him quote frequently.

Hopefully, his words are more than scriptural cliché. Perhaps viral death has presented us with a wake-up call we will not ignore. The catastrophic health threat that now exposes our weaknesses as a species also illuminates our connection. That is the silver lining of the moment. Under the threat of plague, we have been given the opportunity to reconsider how communities and societies depend on one another, despite long-standing, artificial divisions. (3)

It’s not hyperbole to say we are all pieces in a global chain of dominoes. Some of us are much more susceptible, but all are dangerously at risk of falling.

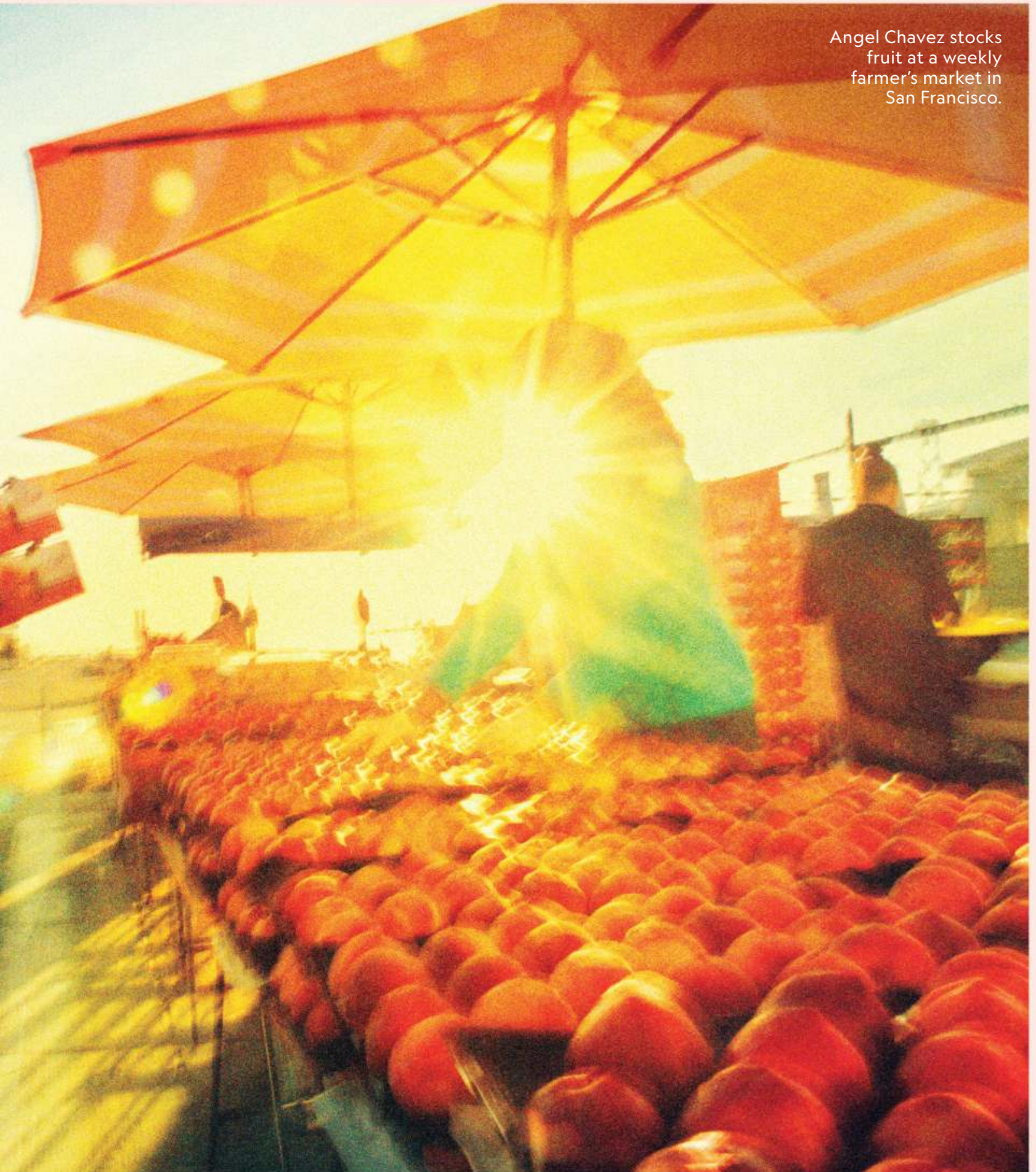
- **FEW AMERICAN CITIES** have been hit as early and ferociously by the pandemic as Detroit. The city has endured the kind of attack that is capable of incinerating hope. Once the auto capital of the world, the Motor City declared bankruptcy in 2013. But

3. COVID-19 has exacerbated the hunger problem in the U.S.: Over 54 million people, including 18 million children, may not have enough to eat. From March to June, U.S. food banks distributed 1.9 billion meals.



WE ARE ALL PIECES IN A GLOBAL CHAIN OF DOMINOES. SOME OF US ARE MORE SUSCEPTIBLE, BUT ALL ARE DANGEROUSLY AT RISK OF FALLING.

Angel Chavez stocks fruit at a weekly farmer's market in San Francisco.



long before that crisis, it had for decades suffered the desperation of being one of America's poorest large cities. Motown was on its way back, though.

Passionate local residents breathed life into their beloved city, investing in Detroit's neighborhoods as others sought comfort elsewhere.

Its riverfront downtown seemed on the verge of roaring to life with a resurgence of high-end restaurants and pricey condominiums. Blighted neighborhoods written off as lost were attracting developers and well-heeled urban pioneers. Then,

in mid-March, COVID-19 struck.

The disease instantly exposed all of the preexisting conditions that made Detroit vulnerable.

Thousands of the city's impoverished, mostly African-American residents lacked running water in their homes because of unpaid water bills. How could they wash their hands to help ward off the virus?

Within weeks of the pandemic's spread, more than 40 percent of city residents employed before the virus struck had lost their jobs, many permanently. Based on a University of Michigan survey with more than 700 respondents, Detroit's unemployment rate by late April was nearly 48 percent—more than double that of the state overall. Death marched in like a parade.

The tragic story of Jason Hargrove offers a cautionary tale of the interconnectedness of strangers and how death stalks even the most pedestrian encounters.

A married father of six, Hargrove drove a public bus for the city of Detroit. His job was considered essential in a city where nearly 20 percent of residents rely on public transportation. Early in March, Hargrove grew worried. He told his wife and work colleagues that he was concerned that the job had become risky.

His worst nightmare materialized, he said, when a middle-aged woman boarded his bus, stood behind him, and coughed repeatedly. She made no effort to cover her mouth.

In a Facebook post on March 21, Hargrove angrily vented at the unidentified woman: "I feel violated. I feel violated for the folks who were on the bus when this happened," Hargrove said in the video.

Eleven days after the video was posted, Hargrove died in an intensive care unit in a Detroit hospital. He was a frontline worker who, in

the age of a pandemic, assumed the risk of a dangerous job.

"Jason cared deeply about his job," said Desha Johnson-Hargrove, his wife. "He wasn't making millions of dollars, but he felt that he was directly responsible for the safety of his passengers, and he always attempted to connect with them. Everyone was greeted with a 'good morning, sir,' or 'good morning, ma'am.' That's the kind of person we've lost."

Just like legions of public transit operators in crowded cities such as Tokyo, New York, or Mumbai, Hargrove didn't have the luxury of working from home. Many of his riders were laborers themselves, headed to low-wage jobs that demand a physical presence in a factory, grocery store, or nursing home. The buses became rolling petri dishes.

- **WE KNOW WITH CERTAINTY** that select groups of people will continue to remain at high risk of getting sick or dying from the virus for the simplest of reasons: They don't have access to health care or, like Jason Hargrove, they work in essential frontline jobs where exposure is all but certain. In the United States, African Americans and Latinos have suffered disproportionate rates of fatalities from health issues often labeled preexisting conditions, or simply because the nature of their work forces them to leave their homes.

The same is true globally. Each time we enter a grocery store, we stare into the eyes of a desperate mother or of others who are unable to shelter in place. That's the interconnection that we suddenly recognize: Some of our most vulnerable are our most essential.

"In too many countries the social contract has been broken, and the very global institutions established to reinforce rights, equality, inclusive growth, and global stability have contributed to the convergence of crises the world now faces," said Sharan Burrow, general secretary

IN DETROIT THE DISEASE INSTANTLY  
EXPOSED THE PREEXISTING  
CONDITIONS—POVERTY, UNEMPLOYMENT—  
THAT HAVE PUT THE CITY IN JEOPARDY.



of the International Trade Union Confederation, which represents 200 million workers in 163 countries and territories.

The breadth of global poverty was, of course, staggering long before the arrival of COVID-19.

Nearly half of the world's population lives in poverty, according to Oxfam, an international charitable organization focused on alleviating global poverty. The combined wealth of the world's 2,153 richest people exceeds that of 4.6 billion people. Coronavirus has exacerbated the horror show in ways still to be determined. In July Oxfam estimated that as many as 12,000 people a day could die from COVID-related hunger by year's end. That number could exceed the number of deaths from the disease itself.

New hunger spots proliferate, not only in distressed countries such as South Sudan and Venezuela but also in middle-income countries such as India, South Africa, and Brazil. (4) Millions who barely survived before the pandemic are now at risk. The United States is not immune from hunger. With businesses forced to shut down and schools relegated to remote learning, households rarely have been more stressed and, in some cases, food insecure.

The Kaiser Family Foundation Health Tracking Poll in May found that 26 percent of Americans reported that since February, they or a household member had gone without meals or relied on charities or government programs for groceries—including 13 percent who said they had visited a food bank or pantry for supplies.

"The awful truth is that food insecurity is exploding here in our own backyard," said Oxfam America CEO and president Abby Maxman in a press announcement.

"Every town has people who are going to bed hungry right now. Those who were on the edge before are now struggling to stay afloat. In Mississippi, nearly a quarter of all residents are experiencing food insecurity; in Louisiana, over a third of all children are facing empty cupboards."

As many U.S. communities struggle to survive intact, (5) those who look out for the most

4. The world's top 10 hunger hot spots are Yemen, the Democratic Republic of the Congo, Afghanistan, Venezuela, West African Sahel, Ethiopia, Sudan, South Sudan, Syria, and Haiti.

vulnerable have become even more crucial.

● **ON A HOT JULY DAY**, Vince Cushman, a manager for the Greater Cleveland Food Bank, was drenched in sweat and directing traffic in a municipal parking lot. Few downtown office workers were driving into the city because of the virus, so the large lot had become a staging area for a weekly food distribution serving about 2,000 families in the Cleveland area each Thursday.

For eight years Cushman has

## RETHINKING OUR SOCIETY NEW WAYS TO LEARN



One positive aspect of schools closing may be how districts are innovating to improve learning from home. Although equal access to tech remains a barrier, tools will be designed that may bridge divides. K-12 students will use technology to help with homework, set goals, and measure progress. And college students may find campus to be optional, Arizona State University president Michael Crow says. ASU is one of a number of schools evolving into a new "national service university," ballooning its enrollment to provide high-quality and low-cost education on a larger scale. —DS

worked at what he calls one of the busiest food banks in the United States. He considers his job a public service. He said he believes community service is a hallmark of Cleveland. That's one reason he was distraught when he contracted COVID-19 in March; from where, he's not sure. He missed nearly six weeks before he recovered.

"We've been through a lot of hard times. That's why in time of crisis, I believe we respond better than a lot of places that haven't had to consistently handle adversity. We also are careful not to judge people in their time of need," Cushman said.

"I always tell my volunteers, we

5. In just one month early in the pandemic, nearly 20 percent of U.S. adults reported losing wages as a result of COVID-19.

never know the circumstance that caused someone to get in a line for food. I don't care if they drove into the parking lot in a Lexus, you don't know if they're homeless and living out of that car. Our job is to treat them with dignity and civility with the understanding that we've been given an opportunity to serve them," he said.

But it's not just the hunger of desperate families that worries educators around the world. The likelihood that children are suffering unrecoverable setbacks in their education is a critical concern.

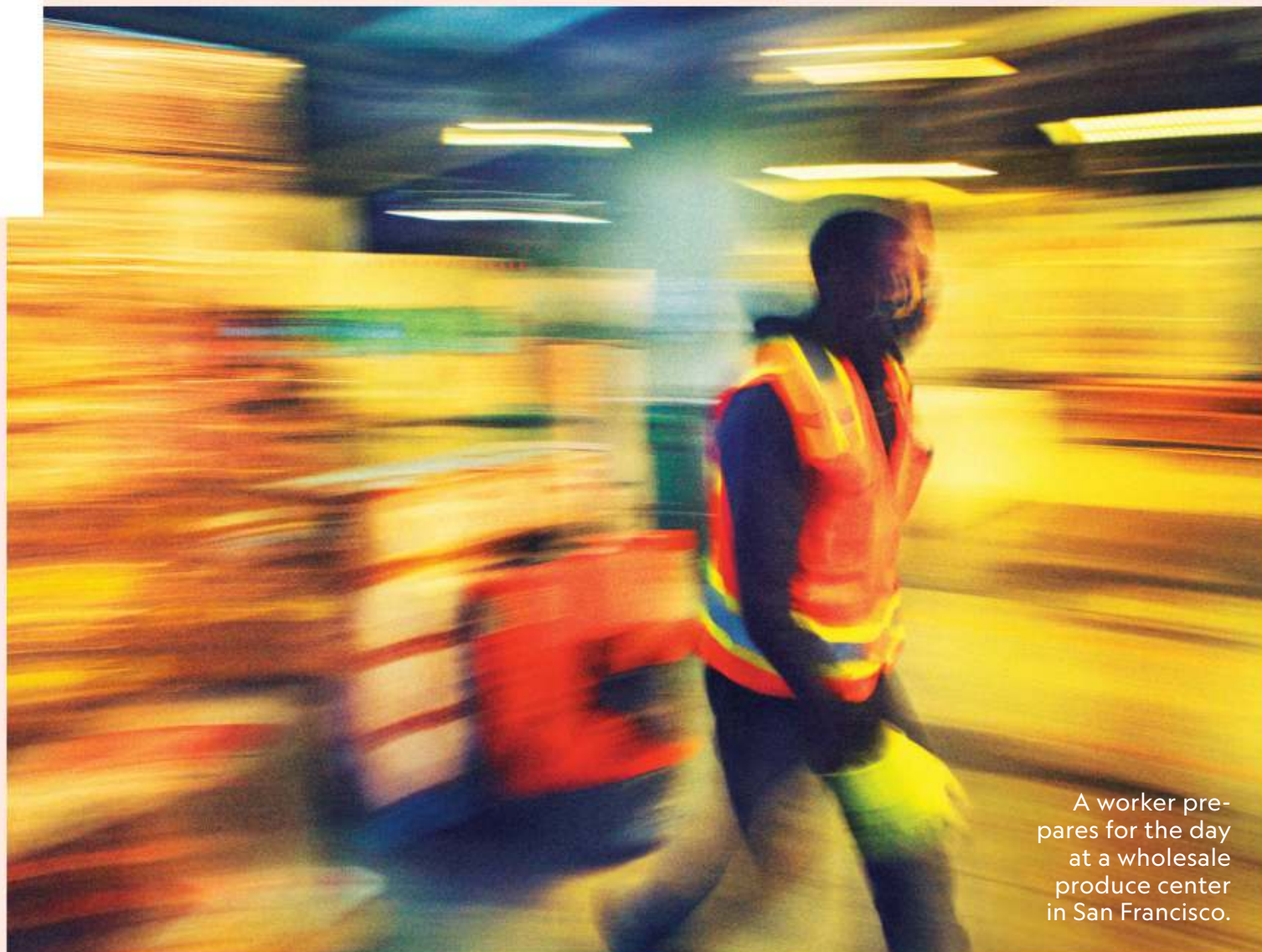
A March poll by the Associated Press-NORC Center for Public Affairs Research found that as U.S. schools switched from in-person classrooms to remote instruction, parents in households earning less than \$50,000 annually were particularly worried about the future prospects for their children. Some 72

percent of these parents said they were concerned that their children would fall behind academically. Meanwhile 56 percent of parents in high-income households harbored the same fears.

"We already know that—all else being equal—students on average benefit academically and in their social and emotional development from being in school," said Aaron Pallas, chair of the Department of Education Policy and Social Analysis at Teachers College of Columbia University. "Even planned interruptions, such as summer vacations, can slow students down, and these interruptions may hit students from working-class and impoverished backgrounds harder than middle-class children and youth."

Despite the pandemic shuttering schools and workplaces and reshaping our daily lives, a reconsideration of history continues. The planet overflows in currents of racial unrest, social uprisings, and continued calls for immediate redress of social inequality.

- **FOLLOWING THE DEATH** of George Floyd, the 46-year-old African American who



A worker prepares for the day at a wholesale produce center in San Francisco.

died after being arrested in Minneapolis on suspicions of passing a counterfeit \$20 bill, one of the largest protests in U.S. history began in earnest. In the five weeks after his death in May, 15 million to 26 million people in the United States participated in public protests, according to several published polls, and millions of others around the world joined in solidarity.

“The scale of protest we have witnessed is unprecedented,” said Deva Woodly, associate professor at the New School for Social Research in New York. “These are coordinated efforts that are happening everywhere, in cities, suburbs, and rural areas. More than 40 percent of the counties in the United States have had a Black Lives Matter protest.”

A breaking point more than four centuries in the making was reached when the world was forced to confront the brutal truth: Black lives haven’t mattered. Floyd’s case finally stripped the privilege of ignorance from the blithely unaffected.

His life may not have mattered to some. His death did to many. Young people from rural America, affluent white students, and multitudes of everyday people joined in solidarity with founders of Black Lives Matter and civil rights activists from around the world in the call for racial and social justice. The ties that bind us together as humans were forged in the air so cruelly stolen from Floyd.

COVID-19 has radically altered many of our social behaviors, but will it change the values of our cultures? Lessons of modern history are encouraging. During the past century, great advances in human rights and social progress occurred in the immediate aftermath of horrendous death and tremendous social unrest.

American women won the right to vote in the wake of the devastation of World War I and the influenza pandemic of 1918. The twin crises opened the American labor market to women and exposed gender inequities that would no longer stand when the war ended and influenza abated.

The United Nations, dedicated to maintaining peace among nations and promoting human and social rights, was formed shortly after World War II. It continues to serve as a referee of global conflict and disagreement.

Black American soldiers returning from the same war against tyranny and fascism served as an early and powerful catalyst for the civil

6. A labor group estimated that the equivalent of 400 million jobs were lost worldwide because of COVID-19, which could push a half billion people into poverty. Women and young people are particularly hard-hit.

rights movement and the overturning of entrenched systems of legalized racism.

Now another grave crisis persists with the relentless attacks of the virus. It demands a universal response. COVID-19 initially attacked our most vulnerable and then gathered strength by standing on the shoulders of our weakest to strike indiscriminately. Cases of the virus continued to surge in the U.S., Brazil, India, and other parts of the world. The virus ruthlessly targeted preexisting health conditions, and massive social inequalities fueled a global inferno.

The lesson for our future is clear: Demanding change and working for global justice and fairness are humanity’s best hope for survival.

We are all connected to the Black washerwomen of Brazil. We’re universally tethered to unheralded and essential workers such as Jason Hargrove, who continued to drive a Detroit bus until days before he died of COVID-19.

At great human, financial, (6) and social cost, the virus illuminates the inextricable ties that bind us all. Those long rendered invisible have shown to be indivisible.

“Jason always took deliberate measures to make sure his passengers were safe and that his bus was sanitized,” Desha said of her late husband. “He was interested in the protection of his passengers, and in return, his passengers would protect him from unruly riders. They all understood that they were on the bus together.”

Death has placed an unforgiving mirror to our face. We’re all on this bus together. □

---

**Phillip Morris** is a Cleveland-based journalist who often explores issues of race, class, and culture. **Pari Dukovic** is an award-winning photographer known for an informal documentary style that’s both atmospheric and colorful.

**BELOW:** Elaine Fields had been married to Eddie Fields for 45 years when he died from COVID-19 complications last April in Detroit. **RIGHT:** Detroit Sufi Muslim leader Salim Joseph was hospitalized with COVID-19 before dying in April of kidney failure. Among his mourners: son Yusuf Joseph (in white) and grandson Humza Joseph.





DISPATCH

# UNITED STATES

In three hard-hit urban areas, a photographer records bereaved people's stories of losing their loved ones to COVID-19 or its complications.

PHOTOGRAPHS BY

**WAYNE LAWRENCE**

133

In Louisiana the extra pandemic burden on Black people—a third of its population but two-thirds of its COVID-19 deaths—extends beyond the cities. **BELOW:** In Greensburg,

where his 35-year-old brother, Marsha Chaney, lived, Derrick Chaney and fiancée Lyndsay Fagan take a moment after Marsha's funeral. **RIGHT:** Pastor Antoine Jasmine's

church is located in St. John the Baptist Parish, which for a time had the nation's highest per capita COVID-19 death rate. Both Jasmine's parents died of the virus last April, hours apart.





BY CYNTHIA GORNEY

**H**OW MANY NUMBERS have you tried to absorb in the months since this began? How many case tallies, risk percentages, per capita infection rates, daily updates in the counting of the dead?

A pandemic is a story told in torrents of numbers. In the newsroom of the *Detroit Metro Times*, where she worked as a writer, Biba Adams took in one number after another as the new coronavirus spread—out of China, across Europe, into the United States, into Michigan. During the second week of March, health authorities confirmed the first COVID-19 cases in Detroit. A few days later, Adams's mother developed a cough.

Wayne Lawrence met Biba Adams in June, as he visited three U.S. cities photographing the pandemic-bereaved: women and men who told him about losing a loved one to COVID-19 or its complications. By that time the virus had killed Adams's mother. It killed her aunt too, and her grandmother. Radio and television programs put Adams on the air, and whenever she spoke, she was direct about both her grief and her fury. If political leaders had behaved differently starting with the earliest warnings, Adams said over and over, then her family members—her mother was a 70-year-old working woman, part of a law firm, a lover of gospel music—might be alive today.

"To lose one's mother is one thing," Adams said in a phone conversation in late July, as the U.S. pandemic death totals were pushing past 150,000. "To lose her as one of 150,000 people is even more painful. I don't want her to just be a number. She had dreams, things she still wanted to do. She was a *person*. And I am going to lift her name up."

Elaine Head. That is the name of Biba Adams's mother. All the portraits Lawrence made, in these centers of concentrated COVID-19 damage, are of the individually bereaved—because their faces, like the names of the dead, are as important as the numbers. The young man in a tie, with his arm around his fiancée, is a Louisiana chemical plant boilermaker named Derrick Chaney; he says his big brother Marsha Chaney was 35 when he died of COVID-19 in a hospital intensive care unit. Counting Marsha and Derrick, nine siblings were in the family home, in the small town of Greensburg, northeast of

"She was more than a number—she was a *person*," says Detroit's Biba Adams, here with her daughter, Maria Williams, and granddaughter, Gia. Adams's mother, Elaine Head, died of COVID-19 complications last spring, at the age of 70. "Still relatively young, if you're in good health," Adams says. "She could have lived another 20 years."





The COVID-19 death of Bronx, New York, pharmacist Yves-Emmanuel Segui desolated his family: wife Gisele (center) and daughters Morit (at left) and Chloe.



**BELOW, LEFT:** “I was always there for him, but I couldn’t save him from this horrible disease,” says Flor Betancourt (at right), with her mother, Inocencia Vazquez, inside

the Brooklyn building where Flor’s brother Juan Vazquez lived. Long disabled by diabetes-related amputations of both legs, Juan died of COVID-19 complications in April.

**BELOW, RIGHT:** Alice Halkias’s husband, Michael, 82, died of complications of the virus in May. The Greek-American couple ran Brooklyn’s Grand Prospect Hall.



**ABOVE, LEFT:** Kevin Mofield and Shatifia Cooke mourn his wife and her mother, Tiffany Mofield, who had COVID-19 symptoms when she died in April at age 43. She was in a New Jersey correctional

facility, nearing the end of a five-year sentence. **ABOVE, RIGHT:** In New Jersey, COVID-19 infected Tony Whalen, 45, his wife, Laura, and their child Maji (at left). Only Maji’s brother, Cai (at right), escaped

the virus. Tony died in March of multi-organ failure and complications of sepsis; Laura says she wants to get the death certificate amended to clarify that COVID-19 took her husband.

**BELOW:** The virus hit New Orleans hard. Ellis Marsalis, Jr.—pianist, saxophonist, professor, patriarch in a jazz dynasty—died there last April of COVID-19 complications. Trombonist

and composer Delfeayo Marsalis (below) is one of Marsalis's six sons, four of whom are celebrated musicians. **RIGHT:** Debra "Mid-Night" Washington, from one of the city's

beloved social clubs, dons finery to welcome back a member who survived COVID-19. The festivities are somber, though: Club founder Ronald Lewis, 68, died from the virus in March.





Baton Rouge. Marsha was a truck driver. He'd been a high school football star, studied engineering in college. "We didn't have friends," Derrick says. "We had us. He was, like ... the pick of the litter, the chosen one. He was the one who kept everybody together."

The two young women with their mother's arms around their waists—those are the Segui sisters, Morit and Chloe. Their father, Yves-Emmanuel Segui, had emigrated from the Ivory Coast, where he trained as a pharmacist. Daily life there is in French; in New Jersey, as he raised his family, Segui kept failing the English-language pharmaceutical licensing exam. Every time he failed, he began studying again to retake it. The reason the *New York Times* could headline the obituary "Indomitable Bronx Pharmacist," after COVID-19 killed him at 60: On his eighth try Segui passed the exam, and he finally had found a pharmacy job, to which he commuted by bus and train from Newark, three hours each way.

The woman in a white sweater, her head erect as she weeps—that's Elaine Fields, whose husband, Eddie, was 68 when he died in April in a Detroit hospital. He was a retired General Motors plant worker, an excellent bowler, a classic car aficionado restoring a 1949 DeSoto. The woman whose pandemic mask bears the face of a beautiful little girl—that's Detroit police officer LaVondria Herbert, married to Detroit firefighter Ebbie Herbert. They're the parents of Skylar Herbert, gymnast and math whiz. June 3 would have been her sixth birthday. She was their only child.

*Tragedies are commonplace*, a song by the late gospel artist Walter Hawkins begins. *All kinds of diseases. People are slipping away*. When Biba Adams collected her mother's possessions from the hospital, she found the printed lyrics folded up in Elaine Head's wallet. Hawkins wrote the song many years ago; it's about gratitude, not disease, and the chorus thanks Jesus. But the lament in its verses presages a virulent modern contagion, a rickety national health system, and a deeply stratified society, all working together to smite with extra ferocity America's racial minorities and the poor (graphic, right). *People can't get enough pay. No place seems to be safe*.

The lyrics aren't precisely true, amid the pandemic of 2020. Some people *can* get enough pay. Some places *are* safe, or at least safer than others. And some tragedies are not common at all.

Adams framed the lyrics and hung them on her dining room wall. In July she finally was planning the memorial for her mother; she wanted it in her own backyard, where masked guests could listen to Hawkins's song and reminisce. She'd ordered a package of live butterflies to release into the air—her mother would have liked that, Adams thought. "I need to have this service," she said. "I need to close this passage." □

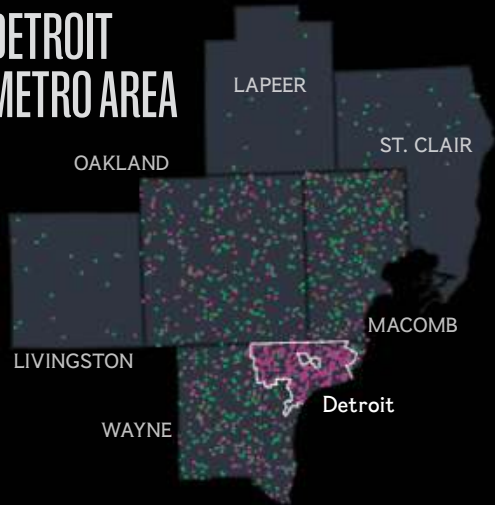
GRAPHIC: MATTHEW W. CHWASTYK, IRENE BERMAN-VAPORIS, AND TAYLOR MAGGIACOMO, NGM STAFF; KELSEY NOWAKOWSKI  
SOURCES: MICHIGAN DEPARTMENT OF HEALTH AND HUMAN SERVICES; LOUISIANA OFFICE OF PUBLIC HEALTH; NEW YORK CITY HEALTH; NEW YORK TIMES; OXFORD COVID-19 GOVERNMENT RESPONSE TRACKER

# DISEASE OF DISPARITY

Although demographic data are preliminary and incomplete, it's clear that COVID-19 is disproportionately affecting communities of color and service-sector workers. Three cities reflect the toll of the pandemic.



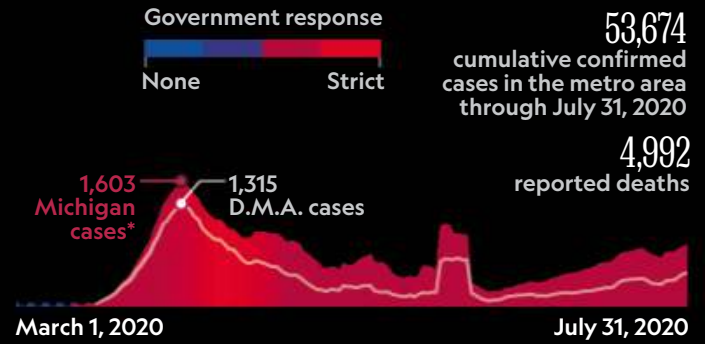
## DETROIT METRO AREA



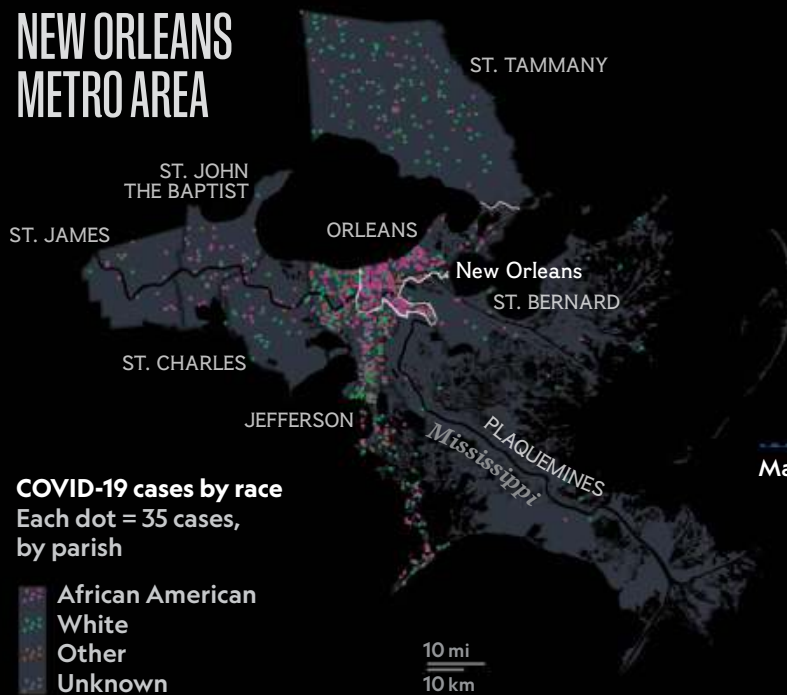
**COVID-19 cases by race**  
Each dot = 35 cases, by county

- African American
- White
- Other
- Unknown

More than a third of Detroit's residents are living in poverty. The city is 79 percent Black, with many residents in the essential workforce. Preexisting health issues include a diabetes rate that's twice the national average.



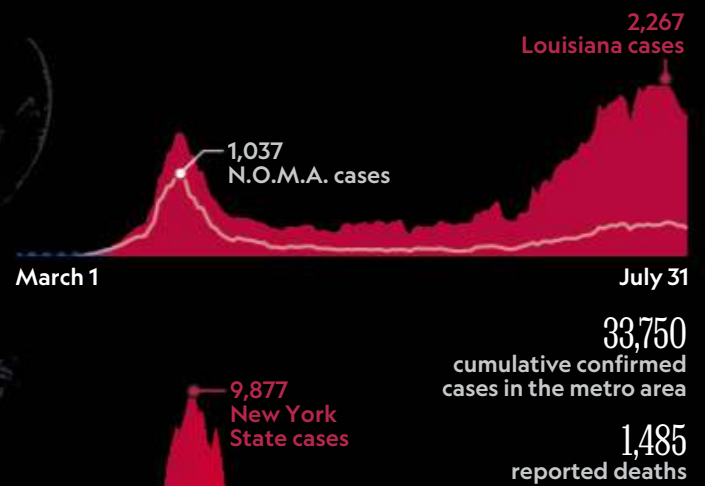
## NEW ORLEANS METRO AREA



**COVID-19 cases by race**  
Each dot = 35 cases, by parish

- African American
- White
- Other
- Unknown

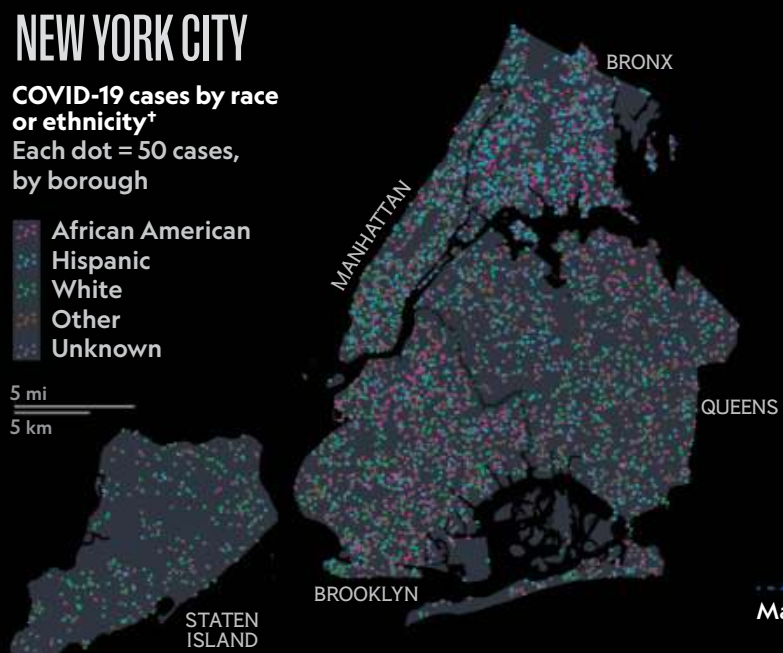
Poverty, unequal access to health care, and high-density housing affect the Black population's risk. In Black-majority Orleans Parish, the poverty rate for families is 17.8 percent—well above the 10.1 percent national rate.



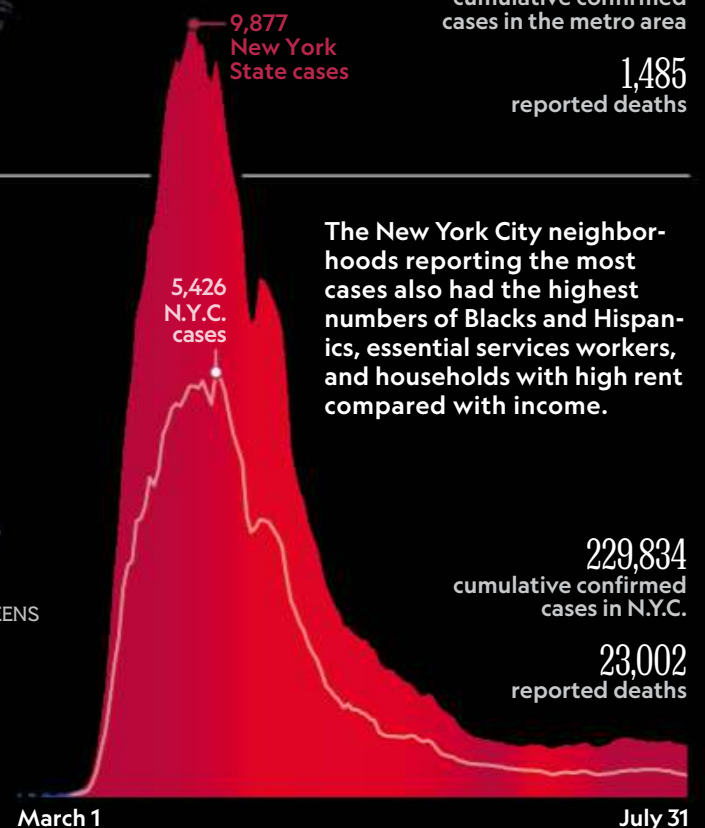
## NEW YORK CITY

**COVID-19 cases by race or ethnicity\***  
Each dot = 50 cases, by borough

- African American
- Hispanic
- White
- Other
- Unknown



The New York City neighborhoods reporting the most cases also had the highest numbers of Blacks and Hispanics, essential services workers, and households with high rent compared with income.



\*SEVEN-DAY CASE AVERAGE. ON JUNE 5, MICHIGAN RELEASED DATA ON PROBABLE CASES. \*MICHIGAN AND LOUISIANA DO NOT RELEASE CASE DATA BY ETHNICITY FOR COUNTIES OR PARISHES.





---

**LEFT:** The Detroit store Abdelfattah Abedrabbo founded and ran with his family carries discount household goods—with tacos for sale in the parking lot. A Palestinian immigrant

who raised six children in Dearborn with wife Azizeh, Abedrabbo died from complications of COVID-19 at 65 last April. Azizeh and daughter Sara mourn near his burial site.

**BELOW:** Detroit police officer LaVondria Herbert's mask bears her daughter's name and face. Skylar, whose father, Ebbie Herbert, is a firefighter, did not reach her sixth birthday.



# Finding Ways to Plant Hope



**COVID-19 AMBUSHED US**, replacing familiar situations with disorienting, deadly unknowns. So much has changed. Too much keeps changing.

How welcome it is, then, to see something that's totally unexpected ... but good in every way. Whimsical. Beautiful. Overflowing with life.

Spain was struck early and hard by COVID-19 and locked down for three months. In June the easing of restrictions was celebrated with a concert at Barcelona's Gran Teatre del Liceu.

In attendance: 2,292 live plants.

The verdant audience was treated to

a string quartet performing Giacomo Puccini's *Crisantemi*. The name means chrysanthemums, a flower Italians use to express loss and mourning.

Artist Eugenio Ampudia hoped that greening the opera house would make it feel "alive, even when there are no people." An unseen human audience did benefit: After the concert, the plants were given to Barcelona health workers.

Reviews were glowing. As one columnist wrote: "In a year with so much darkness and such intense suffering, an act of kindhearted absurdity can lift us up." —PATRICIA EDMONDS

At the end of the UceLi Quartet's performance, air from big fans made the plants in the opera house sway and rustle—which, with some imagination, sounded like nature's applause.

EMILIO MORENATTI, AP IMAGES

**Subscriptions** For subscriptions or changes of address, contact Customer Service at [ngmservice.com](http://ngmservice.com) or call 1-800-647-5463. Outside the U.S. or Canada call +1-515-237-3674.

Contributions to the National Geographic Society are tax deductible under Section 501(c)(3) of the U.S. tax code. | Copyright © 2020 National Geographic Partners, LLC | All rights reserved. National Geographic and Yellow Border: Registered Trademarks © Marcas Registradas. National Geographic assumes no responsibility for unsolicited materials. Printed in U.S.A. | For corrections and clarifications, go to [natgeo.com/corrections](http://natgeo.com/corrections).

NATIONAL GEOGRAPHIC (ISSN 0027-9358) PUBLISHED MONTHLY BY NATIONAL GEOGRAPHIC PARTNERS, LLC, 1145 17TH ST. NW, WASHINGTON, DC 20036. \$39 PER YEAR FOR U.S. DELIVERY, \$44.00 TO CANADA, \$51.00 TO INTERNATIONAL ADDRESSES. SINGLE ISSUE: \$8.00 U.S. DELIVERY, \$10.00 CANADA, \$15.00 INTERNATIONAL. (ALL PRICES IN U.S. FUNDS; INCLUDES SHIPPING AND HANDLING.) PERIODICALS POSTAGE PAID AT WASHINGTON, DC, AND ADDITIONAL MAILING OFFICES. POSTMASTER: SEND ADDRESS CHANGES TO NATIONAL GEOGRAPHIC, PO BOX 37545, BOONE, IA 50037. IN CANADA, AGREEMENT NUMBER 1000010298, RETURN UNDELIVERABLE ADDRESSES TO NATIONAL GEOGRAPHIC, PO BOX 819 STN MAIN, MARKHAM, ONTARIO L3P 9Z9. UNITED KINGDOM NEWSSTAND PRICE £6.99. REPR. EN FRANCE: EMD FRANCE SA, BP 1029, 59011 LILLE CEDEX; TEL. 320.300.302; CPPAP 0720U89037; DIRECTEUR PUBLICATION: D. TASSINARI. DIR. RESP. ITALY: RAPP IMD SRL, VIA G. DA VELATE 11, 20162 MILANO; AUT. TRIB. MI 258 26/5/84 POSTE ITALIANE SPA; SPED. ABB. POST. DL 353/2003 (CONV. L.27/02/2004 N.46) ART 1 C. 1 DCB MILANO STAMPA. QUAD/GRAPHICS, MARTINSBURG, WV 25401. SUBSCRIBERS: IF THE POSTAL SERVICE ALERTS US THAT YOUR MAGAZINE IS UNDELIVERABLE, WE HAVE NO FURTHER OBLIGATION UNLESS WE RECEIVE A CORRECTED ADDRESS WITHIN TWO YEARS.



C A R E S H E R E .

A N D H E R E .



**MORE CLEAN INGREDIENTS TODAY.  
MORE RECYCLABLE PACKAGES TOMORROW.**

You care about a clean future. And so do we.

Proven nutrition is at the heart of what we do. But it's not all we do.

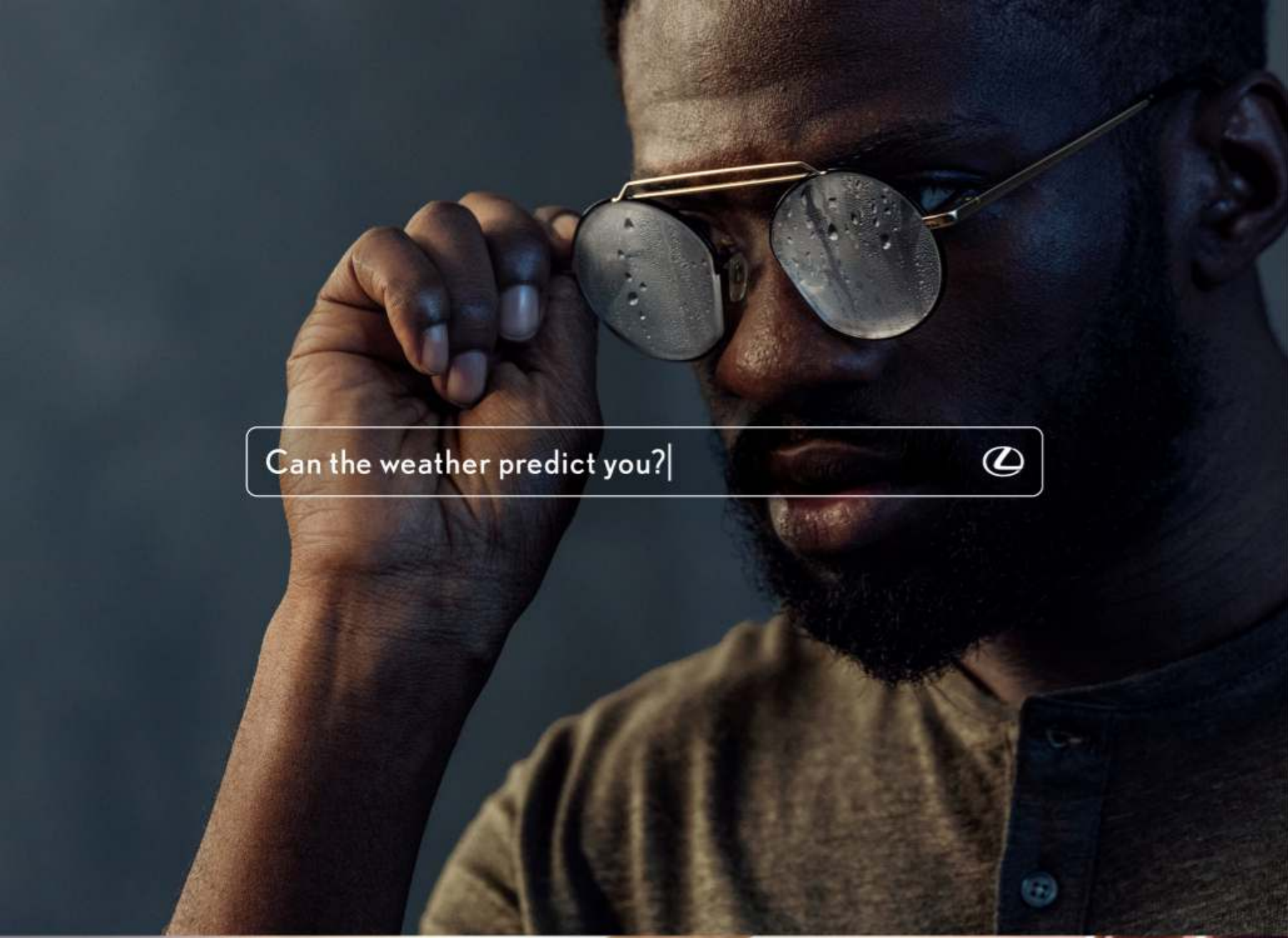
See our commitment to cleaner ingredients and a greener planet at

**PURINA.COM/CARES.**

PURINA TRADEMARKS ARE OWNED BY SOCIÉTÉ DES PRODUITS NESTLÉ S.A.



Your Pet, Our Passion.™



Can the weather predict you? | 



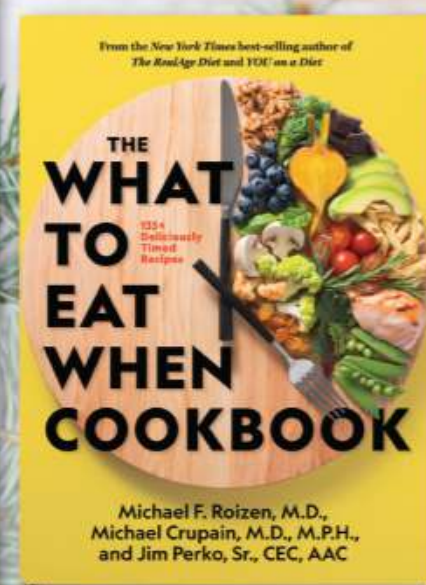
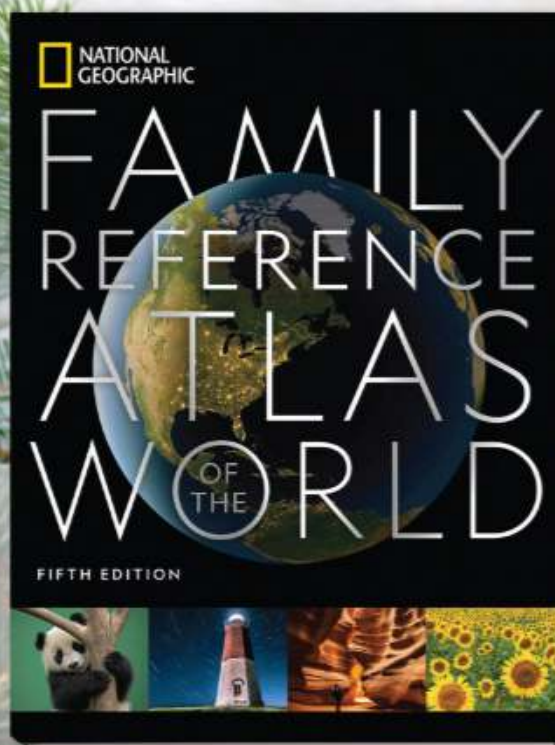
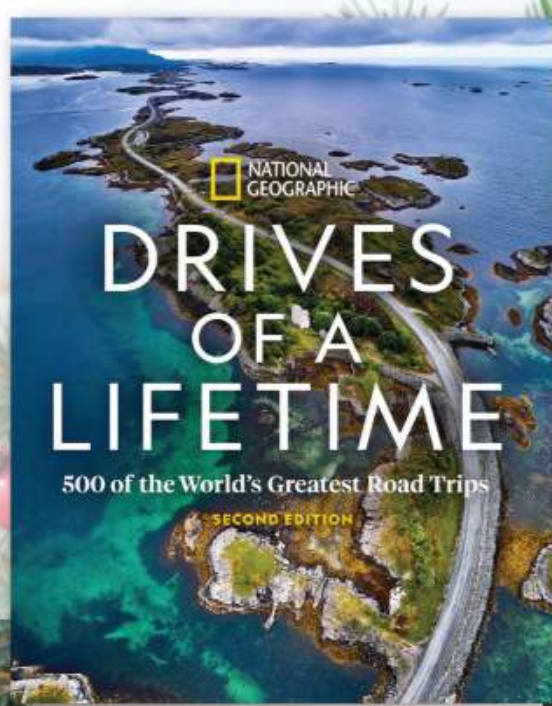
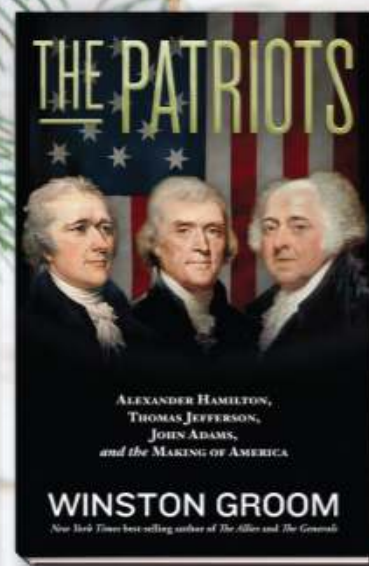
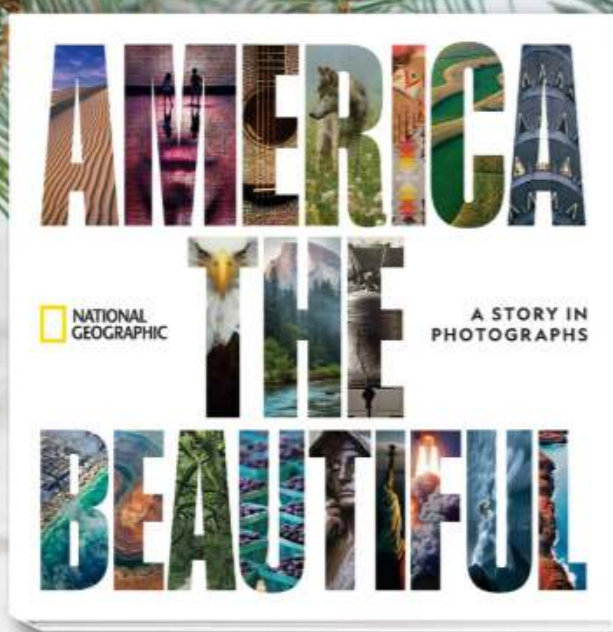
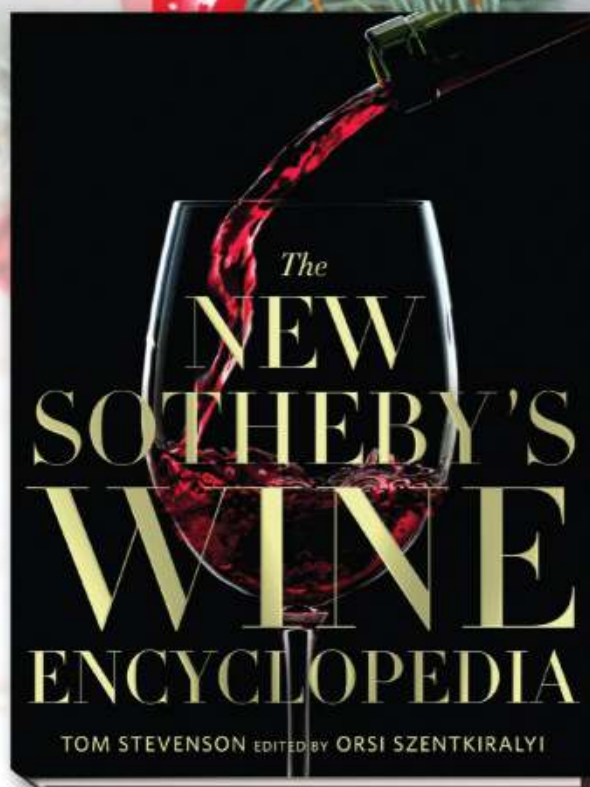
## WE WERE CURIOUS ABOUT THAT TOO

Because you are our greatest curiosity. And we noticed the temperature of your body is constantly fluctuating from one moment to the next. So we engineered the available Climate Concierge with as many as sixteen infrared sensors to monitor your ever-changing temperature, then react with up to twenty air vents, heated and ventilated seats, and a heated steering wheel. Keeping you comfortable, automatically. And not just the driver, but also your passengers. What amazing ideas will you inspire next? Discover the answer at [lexus.com/curiosity](https://lexus.com/curiosity).

CLIMATE  
CONCIERGE


 **LEXUS**  
EXPERIENCE AMAZING

# I GREAT HOLIDAY GIFTS



AVAILABLE WHEREVER BOOKS ARE SOLD

 NatGeoBooks

 @NatGeoBooks

© 2020 National Geographic Partners, LLC

 NATIONAL GEOGRAPHIC

